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INCORPORATING QL USER

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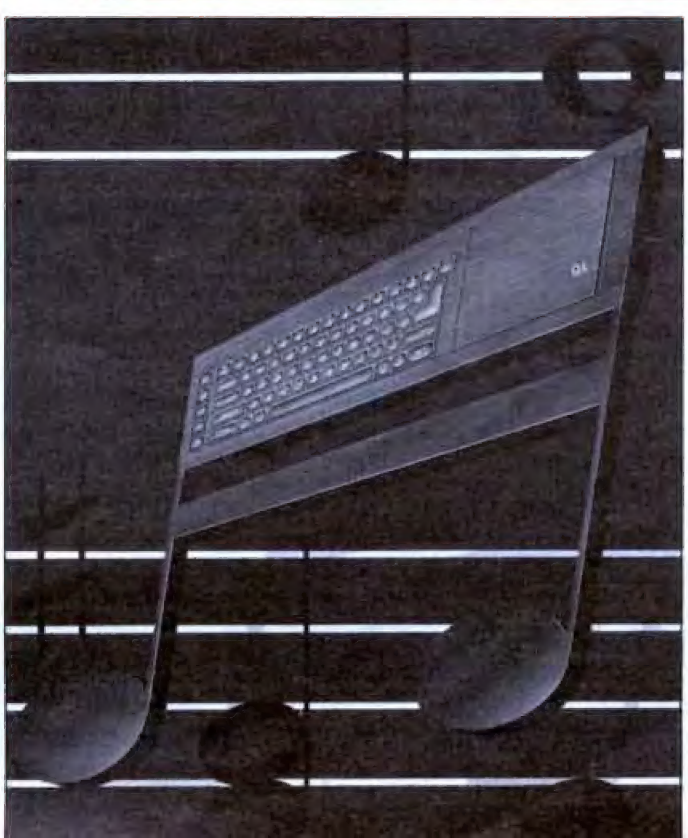

NEXT MONTH

Sir Clive Speaks Out

In an interview with Sinclair QL World, Sir Clive Sinclair explains his reasons for selling to Amstrad. How he now feels about the microcomputer business and what he sees for the future.

Media Star

Digital Precisions's Media Manager could be the answer to your prayers if you get the dreaded bad medium error. The versatile disc and Microdrive utility enables you to recover all but the most drastically corrupted files. We find out exactly what it can do.

PLUS

All our regular features, including software and hardware reviews, program listings and new Microdrive Exchange software.

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The Monitor offers a useful dual screen to assist in debugging graphics programs.

"Talent is on to yet another winner....."
Popular Computing Weekly

£24.95 (+ 50p postage and packing)

COMPARISON WITH OTHER PRODUCTS

	TALENT Assembler Workbench	ADDER Editor/ Assembler	COMPUTER ONE Monitor	COMPUTER ONE Assembler	DIGITAL PRECISION Monitor/Disassembler Version 3.0	METACOMCO QL Assembler Development Kit
Assembler	•	•	X	•	X	•
Monitor	•	X	•	X	•	X
Disassembler	•	X	•	X	•	X
Text Editor	•	•	X	•	X	•
Memory Editor	•	X	•	X	•	X
On-line help	•	•	•	X	X	X
Easy Graphic debugging	•	X	X	X	X	X

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by Stefan Kuhne

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QL SCENE

Organising the QL

Software which connects the Psion Organiser to the QL is available from Transform. The package, which costs £39.95, is complete with a cable to link the Organiser RS232 interface to the QL serial port one and file transfer software.

The software has four main procedures. QL to Organiser down-loads data into the Organiser, enabling mail list files to be displayed, edited and updated. Organiser to QL backs-up and recovers existing Organiser files. Organiser to printer uses the QL as a printer terminal; and Mail List needs no explanation.

Eidersoft has two packags available for the Psion Organiser, Text base and Num base, which is compatible with the Organiser bar code reader. They cost £34.95.

Transform Ltd, 24 West Oak, Beckenham, Kent BR3 2EZ. Eidersoft, The Office, Hall Farm, North Ockendon, Upminster, Essex RM14 3QH.

German utilities

The German software house Ultrasoft has released several new utilities for the QL. Toolbox II is a back up utility using SuperBasic extensions and in addition it is a fast file handler. The package comes with a Qdos compatible Ramdisk, a multitasking clock and system information which appears on screen. Diskmonitor is a screen monitor designed to save or edit disks; it is menu driven and is capable of handling Hex and ASCII entries for file or sector editing.

Both utilities cost £14.95 and are available from a UK distributor Sandy Ltd. Sandy (UK) PCP Ltd, 93 Chiltern Ave, Bedford MK45 9EH.

Precise pictures

ABC Electronic, manufacturer of Giga Basic and EASE, has produced a new graphics package for the QL. Giga Chrome needs an expanded memory of at least 128K and so is more comprehensive than similar programs written for unexpanded machines.

In addition to all the usual features, the program can handle A4 pages and a Spectrum-to-QL screen converter is supplied free with the package, which makes it good value at £34.95. Orders can be taken through the ABC U.K. agent, Digital Precision.

Digital Precision, 222 The Avenue, London E4 9SE.

Giga Chrome — more comprehensive than other programs.

Help for small businesses

A software package designed to make life simpler for small businesses has been released by SD Microsystems. The Small Traders' Pack assists with cashflow and credit control, VAT returns, stock control and address management.

Special features include moving screen displays for promotional work, unit conversions and a flick-through telephone directory. Everything is provided on one cartridge for £19.95, which includes postage and an A4 users' manual.

SD Microsystems (Dept QL), PO Box 24, Hitchin, Herts.

More graphics from Pyramide

The French software house Pyramide, publishers of the graphics program QL Peintre, have released a new software title, Graphic Toolkit.

The program, which will run on an unexpanded machine, provides a comprehensive set of machine code extensions designed to fully utilise the QL's graphic memory.

There are more than 70 extension which operate in mode 4 and mode 8 and are compatible with the Supercharge compiler. They include frame; a facility for loading and manipulating screens in memory, shrink, magnify, and a compressor which enables storing of screens in a fraction of the 32K normally required. The price is £14.95.

Further details from: Rio Promotions Ltd, Dept QL, 28 Waverley Grove, London N3 NPX.

The new Pyramide title Graphic Toolkit.

Free Supercharge

Digital Precision has announced that it intends to drop the licence fee for its Supercharge compiler. Software houses which use Supercharge at present have to pay Digital Precision £250 for the privilege.

Managing director Freddy Vaccha says: "Our income from this is only small, because for every five people using Supercharge commercially only one is paying the licence fee."

ABC Elektronic

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GIGA Soft Mouse Set

Over 1,100 fully satisfied users around the World.
The Giga Soft Mouse comes in a ready-to-use package including a very high quality mouse, an interface for the joystick port of the QL and a software package.

The software consists of the following programs:

Giga–Basic

(Tested in QL User 1/86 p-58)
(Tested in Sinclair User 6/86)

A totally new type of Basic extension for the SINCLAIR QL. It adds more than 70 new commands to SuperBasic. Features:

- Full mousecontrol from Superbasic
- Easily programmable *MACINTOLSH* style pull down menus
- Very sophisticated sprit animation commands
- Fully supercharge compatible
- Programmable function keys
- User friendly full screen text editor with 20 functions
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E. A. S. E.

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Easily Applicable System Environment

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- E.A.S.E. supports real pulldown menus.
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- E.A.S.E. has an inbuilt scientific calculator
- E.A.S.E. gives you fill I/O control, all functions can easily be accessed by using the mouse
- E.A.S.E. windows can be scrolled and moved accross the screen. The the size of a window can be changed by using the mouse.

Price (complete mouse + Giga Basic + E.A.S.E.) **£89.95** from D.P.
* inc VAT & P.&P. OR DM250 (plus 10% airmail post if required).

Giga Soft Dealers

Austria	Firma Zupan GmbH, mandelstrasse 23
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	B 2910 Malderen-Longerzell
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	7 Rue de la Republique
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	Via Ponchielli 26c, 1 10100 Torino
	Dr. A. Tamburello Distaco SRL
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U.K.	Digital Precision, 220 The Avenue
	London E4 9SE

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Features: 3-channel AY 3 8910 Sound IC with lots of sound commands. Includes Interrupt-Sound-Queues with up to 4k of sound information per channel, envelope control, noise control etc.
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Price £69.95 from **D.P.*** inc. VAT & P. & P. OR DM200 (+ 10% airmail post if required) required)

Giga Chrome

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Mouse controlled
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The program needs at least 128K RAM-expansion.
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QL-Paint is now

GRAPHIQL +

Talent Computer Systems announce the launch of GRAPHIQL+

This was formerly QL-Paint, published by Sinclair Research Ltd. in 1985. The rights have now reverted to TALENT.

HERE'S WHAT WAS SAID ABOUT THE PACKAGE WHEN IT WAS FIRST RELEASED ....

"....combines the facilities of one of the most powerful graphics applications with icon-driven simplicity to produce a spectacular package rivalling graphics programs for professional business machines .... for a serious artist it must be the best"

Sinclair QL World, March 1986.

SPECIAL OFFER TO ALL GRAPHIQL OWNERS

Talent can now upgrade your master program cartridge and supply amended documentation. Send £7.50 and your master cartridge and we shall replace it immediately with GRAPHIQL+.

TALENT COMPUTER SYSTEMS
Curran Building, 101 St James Rd.,
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Telephone: 041-552 2128

SOFTWARE FROM SCOTLAND

QL-Paint is a trademark of Sinclair Research Ltd.

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You have an excellent microcomputer . . .
You have superb programs with brilliant graphics – you may spend yours with text or design work.

IT IS ALL WASTED OR NEEDLESSLY HARD WORK WITHOUT A HIGH RESOLUTION MONITOR and by 'high' I mean 585 x 895 pixels. The QL uses 256 x 256 on 256 x 512 pixels so why bother with a high res. monitor you say. **Because the pixels on the screen are not the same as from the computer.** On an ordinary screen pixels get lit that should not or extend beyond the point intended so giving fuzzy images. Also, as the spaces beteen pixels are bigger, all colours are weak.

CHROMA 1 shows text and graphics brilliantly.

DATA: 14" screen; T.T.L. & Linear input; green screen mode; Inverse T.T.L. mode; £299.00 including V.A.T. and carriage.

Chromographica
35, Cliff Road, Hornsea
N. Numberside. HU18 1JB.
Phone: 04012 4699

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OPEN

Discontinued Software

My local QL dealer has been unable to obtain a copy of Games Workshops "D-Day"; Games Workshops advise me that they now no longer produce it.

Do any of your readers have a copy of "D-Day" which they could loan or sell to me?

Graeme Law, Stirling.

Editor's reply: If anybody has a copy of D-Day, or knows where it can be obtained, please let us know.

Compendium

There must be many newcomers to computing with the QL following the offers presently available. Although I started computing with the ZX81, followed by the ubiquitous Spectrum, I have taken advantage of one offer and greatly enjoy the increased facilities the QL provides.

It occurs to me that your magazine must have published many interesting and helpful articles for the QL user and these would be very useful to new owners. Would you consider publishing a compendium of articles which you consider still relevant, or reprint some of them in future issues? I am sure you would find a ready market for both approaches.

R.G. Dingley, Ascot, Berkshire.

Editor's reply: Probably not. Back issues are available, however, priced £1.50.

Not so sweet

Alan Sugar, in blocking any attempt to revive the QL in any shape or form, has nailed his colours firmly to the Amstrad mast. He is not in the business of manufacturing and selling computers, he is in the business of buying and suppressing competition.

Perhaps in view of the fact that you are a computer magazine, not a business magazine, you should ignore him and his products and concentrate your attentions on people and organisations which have some interest in the computer industry

Neil Taylor, Surbiton, Surrey.

Editor's reply: The fact is that Sugar has had a profound effect on the computer industry. Surely that is of interest to everybody?

Serial settings

Having owned a QL for eight months I decided a printer would be a useful accessory for my consultancy work. I wanted, however, a typewriter as well as a printer. After much thought I opted for a Canon Typestar SR. This has the advantage of built in serial interface, comes complete with a set of batteries, and a mains adaptor. A telephone call to Miracle Systems, Bristol, resulted in the serial cable arriving in less than 24 hours — and then it was time to connect it all up.

The instruction book is brief but well written and combined with the QL manual enabled me to get everything working without much difficulty. I opened a serial port, set the baud rate to 1200 — the Typestar also provides 300 and 600 — and listed a programme. I was amazed when it listed correctly — well actually only the first 10 or so lines were correct — then it started typing rubbish. This was clearly due to the printer buffer filling up. The Canon provides two ways of controlling the inflow of data to the buffer, X-on X-off control codes and negating the 'clear to send' line. The QL uses the clear to send signal rather than X-on X-off codes. The Canon manual was at this point rather more use than the QL manual, even after I had found the relevant section.

I had to use an ohmmeter to check the pin connections in the serial cable and dismantled the 25-pin plug to modify the connections. At this stage my wife was very scathing about how impractical computers are unless you have a fair background knowledge. I cut the white wire off pin 2 as the QL does not want the X-on X-off signal and moved the red wire from pin 5 to pin 4: this configuration works using ser2 port on the QL, not ser1.

Setting the printer in Quill involved changing the baud rate to 1200, the port to ser2 and the end of line code has to be CR only otherwise everything is double spaced.

Dr D.J. Grieve, Cornwall.

PS. Obviously the £ sign does not print!

Wanted

Is there any good Samaritan who would be willing to sell me a copy of the QL technical documentation for repair engineers or a copy of the 'QL Technical Manual'? The local Mafia makes it impossible to have access to any serious technical information over here.

J. Van Cakenberghe, Beersel, Belgium.

Editor's reply: The QL Service Manual is available from: CPC, 194-200 North Road, Preston, Lancashire, PR1 1YP.

Baud reader

In response to the comments made by Adam Smith in the August issue of QL World. I suggest the following procedure to spool Quill documents is used.

Set up the spooler Baud rate and default printer name with the install program. The default for Epson type printers is ser1r and for most Brother printers ser1c. Any other printer name can also be used by editing this when prompted for the printer name in the spooler. Printer device names are explained in the Concepts section of the QL manual.

Quill documents are in a special format which must first be changed to standard text before spooling. Load the required document into Quill and select the Print command as normal but when the prompt 'to printer?' is given, type the required filename instead, eg mdv2_letter. This will then be saved to mdv2 as a standard ASCII file with all the translates from the Quill printer driver built in. The filename will be letter_lis. The _lis extension is added by Quill to denote this type of file. A file in this format can then be spooled by the 'Keydefine' spooler and is also suitable for most other spoolers.

A new feature just added to the spooler enhances the Quill translate option. Quill 2.3 has 10 translates to enable different characters from those displayed to be sent to the printer. This is often not enough and the latest version of the spooler will fetch any number of translates from a list in a Basic string 'trans$'. Any number of translates can be added to this list and placed in a boot program.

Barry Ashfield Psientific Software, North Humberside.

Thor point

The "Thor" article in your July issue is most interesting and useful but leaves some unanswered questions.

It does not explain how to get Thor to accept the existing Psion programs from either Microdrive or 5.25" discs, or indeed whether it will run them.

There may be a few like myself, who cannot understand computer technicalities, and would like

CHANNEL

someone to say specifically what advantages there are in using bigger memory with the Psion programs.

Thor is a CST machine and it would be nice to know if disc interfaces and disc drives of CSL origin would qualify for an allowance against the price of Thor and how long the offer to accept the QL in part exchange is expected to be open.

Having deliberately bought separate drives, monitor and printer with the intention of upgrading each it seems hard to be faced with now having to buy equipment which makes the most expensive parts redundant.

J. Patrick,
Whitchurch, Shropshire.

Editor's reply: Eidersoft, the company marketing Thor, will copy all your software on to 3.5 in discs.

Printer tip

I have been interested in the various letters published regarding the Serial 8056 printer. I had difficulty getting the 8056 to underline until I discovered that if you enter the codes into the printer_dat as decimal codes they give the desired result thus Underline On 27, 45, 1; Underline Off 27, 45, 0. The manual suggests that the last code is the number 1 or 0 rather than the ASCII Decimal Value.

I have also used the three 'spare' commands in Typeface on the Quill package to print the three 'spare' facilities on the 8056. Thus bold prints compressed/expanded, Lowscript prints compressed, and Highscript prints expanded.

Here are the codes I used:
Bold on: 27, 15, 27, 87, 1 (ESC, SI, ESC, W, SOH)
Bold Off: 27, 87, 0, 27, 18 (ESC, W, NUL, ESC, DS2)
Subscript On: 27, 15 (ESC, SI)
Subscript Off: 27, 18 (ESC, DC2)
Superscript On: (ESC, W, SOH)
Superscript Off: 27, 87, 0 (ESC, W, NUL).

James C. McGreehin
North Shields,
Tyne & Wear.

Good character

Last month's issue of QL World had a very good article on building a user defined character set. I have been interested in building my own character sets for some time, and was particularly interested in inserting two different alphabets, such as Greek, Russian, Israeli and perhaps Arabic. At first, I was using the toolkit utilities but the documentation found in your magazine permits me now to load different character sets directly.

There is still a problem, that applies to the toolkit utilities too, in using the user defined character sets with machine code programs such as Quill, Archive, Agacus and Metacomco's Screen Editor. These programs use the standard QL character set. It is apparent that the use of a user defined character set, especially if it is a foreign alphabet, within such programs, is vital to those who are obliged to use different languages.

It would be very useful for those who are using special symbols, as in mathematics, astrology and archeology especially as they would probably use Quill and Archive.

The use of a user defined character set as it is documented now, is limited to superbasic programs, and user-built machine code programe. But who would like to build a screen editor, a database program or a world processor, especially as they are already available.

I ask for your help. Is there any possible way to programme a QL to understand the user defined character set as its default.

Alexander Tagaris,
Athens, Greece.

Puzzled punter

On the 13th June, I purchased a Sinclair QL Computer and Wordprocessor and sent off the pre-payed Guarantee Registration Card. I also sent a SAE to Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3DL for a copy of the QL Software Catalogue. Three weeks later, having received no reply, I wrote again to Sinclair Research Ltd asking if they had ever received my letter. I have still had no reply.

Could you please answer the following three questions for me?
1. Is my computer fully guaranteed?
2. What must I do to get a copy of the QL Software Catalogue?
and
3. I was told that I should receive six months' free subscription to Sinclair QL World magazine and free copies of the Sinclair QLUB newsletter for one year. If this is true, when can I expect to receive my first copies?

I am fully aware of the situation which exists between Amstrad and Sinclair since the takeover but surely with the help of a computer it would not be too difficult for letters addressed to Sinclair to be passed to Amstrad for attention?

Jack Boswell,
Stockley, Wilts.

Editor's reply: 1. Yes.
2. The QL software catalogue no longer exists. The best way to find out about QL software is to read this magazine.
3. Shortly after they announced this offer Sinclair withdrew it, but the offer letters still went out with new machines. The result was many confused, not to mention irate buyers.

Contributions

I am considering writing an article for possible publication in your journal. Can you tell me whether you accept unsolicited material and, if so, provide details of your rates.

A. J. Pringle
Dunstable, Beds.

Editor's reply: Your article should be typed or printed, double spaced on one side of the paper only. Articles which include program listings should be accompanied by a Microdrive so that the software can be assessed.

We pay £80 per thousand words published, the same rate applies to program listings.

The best guide to the kind of material we are looking for is the magazine itself. Reading back issues will give you a good idea of the kinds of features we are interested in as well as the style in which to write.

Generally, we are not interested in hardware or software reviews as these are done in-house. There are, however, exceptions. If you think you have something of interest give us a ring. We are always on the look-out for interesting business articles for our regular software applications feature. So if you use a QL for business and have something new to say, let us know.

The brief is really as wide as you care to make it — anything you think would appeal to readers. If you are unsure as to the suitability of an article, just send us a brief synopsis and we will contact you if we are interested. Finally, if you want your article returned, please include a stamped, self-addressed envelope.

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by Ian Stewart and Adrian Soundy

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SOUNDING OUT THE M·I·D·I

Mark Jenkins runs the synthesiser music label AMP Records which operates from the highly-computerised Unicorn Studio. He speculates on the place of the QL in the musical scheme of things.

When micros as humble as the Spectrum, Atari 800 and Commodore 64 have well-established places in the world of music why does the relatively powerful QL fall flat in this field? The reasons are probably twofold. The built-in QL sound is fairly basic, only slightly more advanced than that on the Spectrum, and so it is not a very exciting machine for stand-alone musical experimentation. The alternative would be to connect it to some more powerful voice modules, such as pro-

fessional synthesisers, and use it as a control unit. This would usually be done via a Midi interface.

The problem is that the QL has no Midi port, unlike the Spectrum Plus, which has an eccentric but workable version of Midi, and the Atari 520ST/1040ST, which has an eminently sensible implementation of Midi. That means that it would be necessary to develop a dedicated Midi interface, the work of a few days for any competent designer, but scarcely attractive to the international musical intrument companies considering the low overseas penetration of the QL.

So perhaps we can stimulate someone to boost the musical potential of the QL by describing how easy the problem is to solve. That is best done by starting with a basic description of the Midi interface.

In the last few years musical instruments have become more and more like microcomputers as processor technology has been used to solve the problems of polyphony — allowing a keyboard to play more than one note at a time — and programmability — permitting the user to store complex sound patches which otherwise would be difficult to reproduce.

Almost universal

Once microprocessor-controlled synthesisers such as the Sequential Circuits Prophet 5 and the Roland Jupiter 8 became common there remained the problem of interfacing one to another, since every manufacturer used different methods of inter-connection for their equipment.

Engineers commanded high fees to make instruments from different manufacturers inter-compatible but after Dave Smith of Sequential Circuits had difficulty getting his Sequential Polysequencer design to control the Prophet 5 synth, he proposed a Universal Synthesiser Interface which would solve all such problems in the future.

Japanese instrument manufacturers, such as Roland and Yamaha, were interested in USI but added many facilities to it and announced the new format as Midi, the Musical Instrument Digital Interface. After only one significant updale about 18 months ago, taken care of by EPROM changes on

most instruments, Midi is used almost universally on new home computer interfaces, synthesisers, drum machines, sequencers and even guitars.

Midi is a binary language which uses a serial interface having a five-pin DIN plug as connecting hardware. Only three pins of the DIN are used for earth, live and return loop; Midi In or Out sockets, or both, will be found on all instruments, and a Midi Thru socket — passing on the input signal — is an option.

Midi is a serial communications standard, so its transmissions must be labelled as either Status bytes, to choose a new function, or Data bytes, to transmit a new value. The functions which can be communicated by Midi include playing and silencing notes, choosing new sounds in memory, assigning a velocity to a note to change its tone or volume, applying vibrato or some other form of modulation, and much more.

Most transmitted Midi values run from 0 to 127, which is convenient in the case of note transmission, since 128 notes covers an 11-octave piano keyboard, more than would be needed for most conventional compositions. The most obvious use of Midi is to connect two synthesisers, one as master and one as slave, and add their sounds to create much more interesting textures; the next most popular use is to record many tracks of Midi infor-

mation on a computer and play them back simultaneously on several synthesisers to create a complete composition.

Midi Status Bytes and Data Bytes are differentiated by a Flag consisting of a 1 on the start of a Status byte and a 0 on the start of a Data byte. The other seven bits of a Data byte comprise a single number from 0 to 127, while the rest of a Status byte is in two parts — a three-bit Category and an extra four-bit piece of information.

Midi Status information is in five categories — Channel, System Common, System Real Time, System Exclusive and System Re-set — with several operations possible under each category — identified by the added information in the Status byte.

So 1xxx xxxx is a Status byte
and 0xxx xxxx is a Data byte with a value of 0–127.

Data beginning 1001 is identified as "Channel; Note On" information, announcing that a new note is to be turned on, while the following half-byte specifies the Midi channel to be used. Midi has 16 channels and instruments can be set to receive all, only one, on occasionally several of them and to ignore the others. In practice, a computer or other controller can deal with up to 16 Midi instruments playing different patterns simultaneously. A short transmission to switch on and off two notes would go like this:

10110011 All notes off for
01111111 Midi channel 3
00000000 in Poly mode.

10010011 Note on channel 3;
00111100 Note is C4;
01000000 Velocity is 64.

00111110 Note is D4;
01100000 Velocity is 96
00111100 Note is C4;
00000000 Velocity is 0
— turns off note.

Poly mode means that an instrument is looking for one specific Midi channel and will ignore all others; responding to all channels is called Omni mode and is not of much use, while Mono mode indicates an ability to respond to a different Midi channel, with every available note or "voice" of the synthesiser producing a different sound.

As to what instruments can be controlled by a Midi interface, the Casio CZ-101 is a professional synthesiser with miniature keys which can play eight-note chords or four single-note sounds in Mono mode. At £248 or so it is a good compositional tool.

Roland synthesisers start at about £458 and have full-size keys but will play only six notes at a time in Poly mode. Yamaha also has budget synths such as the DX-100 using the cutting and realistic FM sound-generation method but its bigger DX-7 model — around £1,200 – responds to the velocity with which the keys are struck, pressure applied to the keys, and many other parameters.

Many drum machines with "real" digitally-sampled sounds also respond to Midi, which includes a regularly-transmitted clock code to synchronise such instruments — System Real Time data. Also there are now several pick-up devices available to convert performances on a guitar into Midi information and record them on a micro for replay on a synthesiser, which may or may not have a keyboard as well

The Yamaha DX-100, like the Casio CZ101 an ideal budget Midi synthesiser.

So how does a micro gain access to the world of Midi? Almost any input/output port capable of binary transmission may be used and the interface must convert the transmissions to the correct level and crystal-lock the baud rate very close to the Midi standard value. Details are:

Circuit is a 5 milli-amp current loop.
Current On signifies a 0 — data low.
Current Off signifies a 1 — data high.
Opto isolators protect the instrument processors from potentially hazardous charges.
Transmission rate is 31.25K baud — 31,250 bits per second.
Transmissions are organised in packages of 10 bits — Start bit, eight Data bits, Stop bit.

So far as the QL is concerned, the obvious output to try is the RS232 port and one manufacturer, Hinton Instru-

ments, already sells an interface called Midic which converts RS232 to Midi. Midic has built-in Midi software for various control functions and can use either 9-bit binary or ASCII hex format. The interface costs £300 — £350 with battery back-up to retain patterns — and a QL interface cable is £15.

It is worth contacting Hinton for the latest updates but it would be even better to find a dedicated QL interface which should sell for around £30.

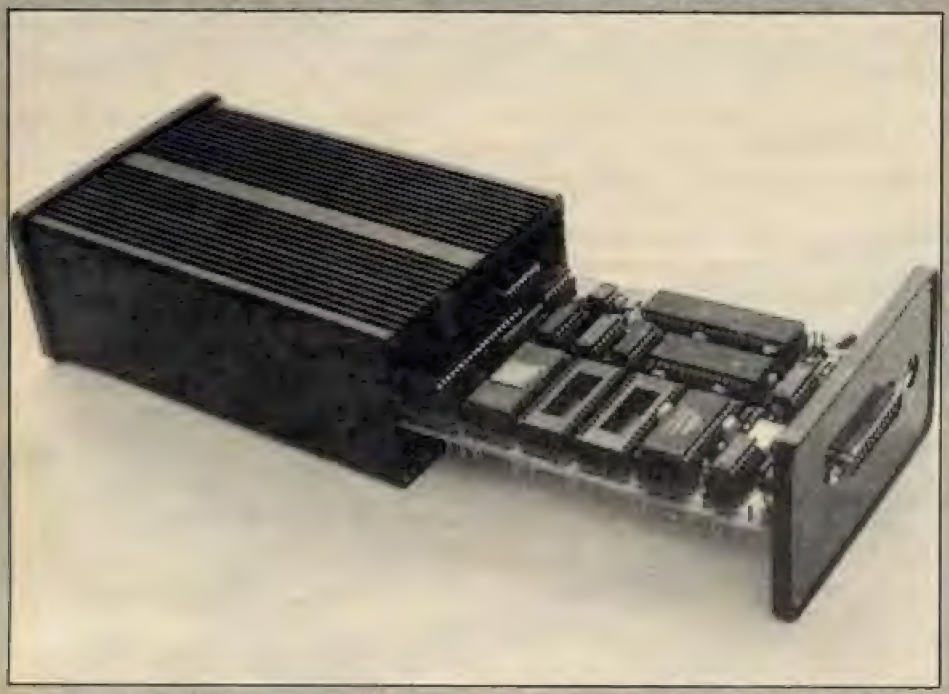
How can any serial interface be expected to cope with complex, "live" music transmitted via Midi? From the figures we can see that each bit will take only 320 microseconds to transmit, so Midi is fast enough to give the impression that the notes of a chord are played simultaneously or that several instruments are playing together rather than queueing for their next command. Some delay problems occur if many instruments are used together or if a large amount of pitch bend or pressure data is transmitted, but most software packages allow the user to add delays to the earlier tracks to compensate.

The Midi specification includes System Exclusive codes which are left open for each manufacturer to use as it wishes. Most use them to transfer sounds from one synth to another of the same make; ID codes are assigned to each manufacturer and instruments from any other company will ignore System Exclusive information transmitted after an incorrect ID. Example IDs in hex include Sequential Circuits = 01, Big Briar = 02, Moog = 04, Roland = 41, Korg = 42, Yamaha = 43 and so on.

Midi System Real Time codes are the clock signals while System Re-set is a special code to return an instrument to its power-up condition. There are many clever applications of Midi transmissions available in computer software; one popular sequencer package sends a "Channel; Note On — Middle A" code to every connected unit if you hold down the "A" key and some packages can create echoes by re-cycling Midi information received.

The most obvious musical use for a QL is as a powerful controller to store, re-arrange and replay notes on several instruments simultaneously. Many software packages on the Commodore 64, Atari 800 and 520/1040ST, Apple MacIntosh and Spectrum do that by simulating a tape recorder with eight or 16 tracks — Fast Forward and Re-wind controls, Cut and Merge functions and so on.

Hinton Instruments RS232-Midi interface.



There are many other possible applications connected with the System Exclusive transmission of memory data. Most modern synthesisers compromise to some extent on the controls available on the front panel to save money. That makes it difficult to create new sounds; the Yamaha industry-standard DX-7, for instance, uses 147 parameters to define each sound but has only one control slider.

So interactive graphic displays of sound parameters have become popular micro-Midi packages, particularly since sound sampling — holding real sounds in digital memory — has become popular on many instruments. Being able to display the waveform of a sampled sound on a computer monitor and edit it to find the smoothest start, end and looping points is an enormous advantage to the musician.

Recently the imagination shown by Midi programmers has increased; for instance, the DX-Droid program creates Yamaha DX-7 sounds randomly, transmits them to the synth via Midi, and allows you to alter, save or scrap them at will.

Whether the QL is used as a music composer or sequencer, as a graphic editor, or for even more exotic functions — the U.S company Hybrid Arts developed a micro-controlled Midi package to oversee a Protein Synthesis experiment — it can offer good value. A dedicated Midi sequencer such as the Roland MC500 costs around £800 but a micro such as the QL can perform all its functions and more, with much more informative screen displays, for the cost of only a Midi interface and software.

If anybody has been inspired to delve into the world of Midi interfacing a little further, a useful document is Midi 1.0, the basic Midi hardware and software specification, available from Sequential.

Sequential, Postbus 16, 3640 Mijdrecht, Netherlands. Tel: 010 318 2979 6211.

Hinton Instruments, 168 Abingdon Road, Oxford OX1 4RA. Tel: 0865 721731.

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QL Storage *from* CST

QDISC

Now containing the complete QL Toolkit software as well as an easily used Ram-Drive device driver, the CST QDisc is the longest established and most widely used floppy disc controller for the QL computer. The QDisc interface may be used with virtually any 3.5" or 5.25" floppy disc drives including, of course, CST's dual slim-line 720K (1 Megabyte unformatted) high performance, 80 track double sided drives. The Toolkit software provides a wide range of SuperBASIC commands and functions designed to allow the full power of the QL to be realised without resorting to machine code programming, giving access to job control, random access I/O, character sets, wild card file handling and so on. The Toolkit is included in the QDisc firmware, so it is ready for use as soon as the system is switched on, as is the Ram-drive device driver, which allows any unused memory to be used as a high speed storage medium, ideal for temporary results, and for saving screen images for high speed displays. Naturally the Ram-drive may be used to maximum advantage when used on a QL with additional memory such as the RAM-plus.

RAM plus

Expanding the QL's memory from 128K to the maximum 640K, the CST RAM-plus is based on the latest 256K DRAMs to give full speed no wait-state operation and is housed in an elegant aluminium case which matches the QL and provides an expansion port allowing a peripheral interface, such as a QDisc floppy or Winchester controller to be plugged in. Adding high speed memory to the QL has several advantages: all QL programs run faster, including ones that make heavy use of disc or microdrive as QDos uses spare memory for buffering data; increased data space is available for SuperBASIC, Psion and other application packages and the QL's multitasking ability is greatly enhanced by the ability to load several large programs simultaneously. The extra memory can also be used to advantage with the Ram-drive firmware supplied with the QDisc. For customers who have already purchased an earlier QDisc controller, the Ram-drive software can be supplied on floppy disc at a small charge.

20MBytes!

The flagship of the CST fleet of storage devices for the QL is the 20 Megabyte Winchester drive with integral floppy drive. The system is housed in a compact metal case with integral power supply and is interfaced to the QL by a small controller card. The floppy specification is the same as the standard QDisc; the Winchester is a high performance drive unit based on the new SCSI standard, which allows up to eight drives to be connected to one QL (available to special order). The Winchester firmware is fully compatible with standard microdrive and floppy QDos drivers, and also supports heirarchical directories and file date stamping. The directory structure allows files to be separated into compartments; for example, programs can be held in one directory while data for various projects can be held in other directories. This is essential when a disc can hold over 1000 files! Date stamping of files is used to keep a record of the last time every file on the Winchester was accessed, modified or backed up. This allows the Data Management Utility supplied with the system to archive only those files which have been changed since the last backup was performed. This greatly reduces the time taken to perform regular backups.

CST

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James Lucy reviews Q-Liberator, the first program to contest the Digital Precision monopoly on compilers

How many people, like me, misread the initial glossy advertising for the QL and expected multi-tasking of SuperBasic programs? They might have assumed, too, that the powerful M68008 processor would provide fast SuperBasic benchmark timings but when the Quaint Laggard finally appeared all those naive hopes were shattered.

The fact was that you could have more than one program running, but only one could be SuperBasic, and that SuperBasic was flexible, extensible, structured and in every way wonderful except that it was slo-o-o-w.

By Christmas, 1985, all that had changed. The Digital Precision *Supercharge* compiler, written by Simon Goodwin and Gerry Jackson, provided speedy, multi-tasking SuperBasic programs in one fell swoop. Excellent though the product is, it makes various compromises and assumptions about its users' needs which may not suit everyone.

A gap exists in the market for a compiler which makes a different set of assumptions. *Q-Liberator*, a product from the debutant company Liberation Software, now fills that gap.

Before becoming involved in the relative merits of Supercharge and Q-Liberator, it is worth considering some of the benefits of compilation in general. A normal SuperBasic program is a list of instructions to the SuperBasic interpreter, which is a machine code program whose purpose is to use the microprocessor so that it is the original SuperBasic program which appears to be running.

More compact

The problem is that the interpreter usually spends much more time sifting through the user's program than it does running the code required to put the program into effect and the answer is to turn the SuperBasic program into machine code before running it — in other words, to compile it.

The fact that a compiled SuperBasic program is machine code means that it may be run as a Qdos job, multi-tasking with others, and it is naturally very much faster than the original. It is likely to be more compact and will be very well protected against prying eyes. The excessive loading time of SuperBasic programs, caused by the necessary tokenisation process, is reduced very significantly since tokenisation is no longer required. The compiler is likely to support full integer arithmetic, unlike the interpreter and that can be many times faster than the floating point equivalent.

So why not throw out the interpreter and use the compiler exclusively? The one disadvantage of compiled Basic is that it is more difficult to modify and debug; with an interpreter to develop the program, and then a compiler for the finished product, you really have the best of both worlds. An interesting corollary is that there is growing interest in developing interpreters for normally-compiled languages like C for that reason.

Some very neat and useful programs can be written in compiled SuperBasic. The Supercharge manual suggests two, a multi-tasking clock and a spooler, both of which require only one line of SuperBasic. I have written a very simple program defining a hot-key which, when pressed, dumps the screen contents to a file and there are numerous other possibilities. Naturally, all this could be written in assembler; it just takes anything up to 100 times longer.

Since we last looked at it in the March, 1986 issue, Supercharge has carved a distinct niche in the market; for almost a year it has been the only product of its type, which would probably guarantee its success anyway, but it is also a very good compiler. Supercharge is being updated and improved continuously and owners of earlier versions can, if they wish, make use of Digital Precision's rather pricey update service.

It has some failings. It is rather intolerant of poorly structured SuperBasic, places a limit of 64K on object — i.e., compiled — code size and cannot compile very large programs in an unexpanded machine because it needs a large portion of the RAM for itself.

It also has that wretched Lenslok protection system and a hefty licence fee if you wish to market products compiled with it. Supercharge will not countenance some of the more esoteric SuperBasic programming techniques, although most of them could be replaced with better, more structured code in any case — computed GOTOs, for example.

No limit

Despite the various minor disadvantages, Supercharge comiles quickly and produces code which runs very fast in comparison to the interpreter. It is well-supported and has an excellent manual containing considerably more information then most people are likely to want to know about SuperBasic compilation.

Q-Liberator is a very different kettle of fish. It will compile almost anything you care to throw at it — even my Composer program which is very badly-structured — but the finished code runs markedly slower than a Supercharged program — see the benchmark section. It will compile significantly bigger programs than Supercharge in an unexpanded machine and imposes no limit on the size of the finished code.

Extensions to SuperBasic written in assembler may be included in the compiled program, whereas Supercharge requires any extensions used to be linked-in first. Addicts of the Care/ QJump Toolkit II will be pleased to find Q-Liberator support for the various features, such as communication between jobs and passing strings with the 'EX' command. The passed string will appear in the reserved variable 'cmd$' and can be processed and used like any other SuperBasic string — it could easily be a file name for a spooler.

A system of compiler directives, embedded in the SuperBasic source program and hidden from the interpreter by REMarks, allows the space allocated for heap, stack, input buffer and channel table to be defined, a con-

siderable improvement on Supercharge.

Once loaded, the first stage of the compilation is achieved by issuing the direct command 'COMPILE progname', which creates a file on the chosen device containing the tokenised form of the compiled program, among other things. If sufficient RAM is available, the next stage of the compiler will be loaded and run automatically; if not, the original SuperBasic program may be removed from RAM using NEW and then the second phase run with the EXEC command.

Two-stage process

On an unexpanded machine Q-Liberator will compile programs of up to about 12K with just the single 'COMPILE' command; the two-stage process will compile programs which almost completely fill the QL, whatever the memory expansion fitted. In my pre-production version, a small window is opened containing various prompts; they are used to specify object code and listing filenames, and to enter the compiler options required.

The options allow the run-time support to be included in the object file if required, and a cross-reference listing of SuperBasic line number to object code address may be produced. If you choose not to include the run-times, the resulting files will be much smaller; since several programs can share the same run-times this can be a significant advantage in terms of file space.

The process of compilation is slower than with Supercharge but the lack of protection systems, the more open nature of Q-Liberator and the fact that it can be run safely from RAM disc means that the overall compilation time is comparable for average length programs.

Two Microdrive cartridges are included, one a write-protected master and one a back-up, both cartridges containing identical files. That is an excellent idea and obviates the usual search for a spare cartridge to use for the back-up. Q-Liberator is not copy-protected and there is no restriction on the distribution of programs compiled.

Benchmarks are much beloved of reviewers because they provide some hard facts and figures to reinforce opinions. The problem is that it is impossible to devise tests which will allow comparison of machines on an equitable basis; the QL performs poorly on benchmarks but on the other hand its Basic is one of the most comprehensive available.

Having expressed my reservations, I intend to provide benchmarks because they tell an interesting story. The table shows the industry-standard *Personal Computer World* benchmarks in columns B1–B8. The benchmarks test loops, operations on variables and constants, array handling and various mathematics functions and were run on a QL with the slower internal memory upgrade and a JS ROM. I selected B2 and B7 arbitrarily for a simple re-write using integer arithmetic, calling them B21 and B71, and also used the demonstration prime number calculator on the Supercharge tape, calling it Primes.

Benchmarks

	B1	B2	B3	B4	B5	B6	B7	B8	B21	B71	Primes (300)
SuperBasic time (secs)	2.2	5.8	9.8	9.6	12.2	24.9	43.3	21.7	6.3	64	74
Supercharge time (secs)	0.4	0.6	2.1	1.7	2.0	5.3	7.3	11.1	0.4	5.5	5.0
Q-Liberator time (secs)	0.5	1.7	3.9	4.9	5.0	8.4	12.7	12.6	0.8	10.4	11.0

Q-Liberator does not fare too well on speed, while still offering very useful improvements on SuperBasic, although it scores well on compactness. The object code size can be very small — c.500 bytes for the benchmarks — and since only one set of run-times (8K) is needed for any number of programs a great-deal of file space can be saved.

As a final thought on speed, Q-Liberator can without fuss compile programs which will require considerable re-writing for Supercharge; the Q-Liberator version could be up and running, albeit more slowly, long before the Supercharged program.

Q-Liberator offers speed-up factors of anything up to four to five, and Supercharge can be two to three times faster again. Even greater improvements can be gained with integer arithmetic, although I was unable to match the figures in the Supercharge manual which claimed anything up to 58 × speed-up.

That could be because I was prepared to do only a simple re-write; I did not use the faster in-line code option on Supercharge and the programs were running in internal and not the faster, external, memory. Nevertheless, the speed improvements are nothing short of remarkable and Supercharged SuperBasic appears faster than any interpreted Basic running on any micro. On real programs, much longer than the benchmarks, the improvements could be even greater.

They are both first-rate programs. If speed is the prime consideration, Supercharge is much faster; if ease of use — and no Lenslok — is paramount, or if very large programs are to be compiled, Q-Liberator is a winner. Whichever you choose — and many people will find a use for both — you can look forward to all the benefits of speed, compactness, fast loading, multi-tasking and protection.

Q-Liberator £69.95
Liberation Software
43 Clifton Road
Kingston-upon-Thames
Surrey KT2 6PJ
Tel: 01-546 7795

Supercharge £59.95
Digital Precision
222 The Avenue
London E4 9SE
Tel: 01-527 5493

THE COST OF COMMS

Mike James tests out the new Astrocom 1000 modem and evaluates the cost of going on-line.

Using a microcomputer to access databases is far from being a new idea but it is surprising how many people have not yet tested the water. Perhaps it is something to do with the possibility of incurring huge bills for services which are not required which deters people or perhaps it is something to do with having to invest in extra hardware without being sure it is useful. It is true that there are some expensive — in my opinion very over-priced — services but in the main they offer such specialised information and they are easy to spot and evaluate before you use them. The cost of the necessary extra hardware may also be a deterrent.

The new Astracom 1000 modem for the QL, at £173 plus VAT, at first seems to reinforce the idea but when you take into account its full range of features its price seems reasonable. As well as being a full auto-dial/auto-answer V23 and V21 modem — i.e., suitable for getting on-line to almost every public database service as well as starting your own — it is complete with a full communications program — Prestel emulation, full graphics printer dumps — and a Centronics-type parallel interface. It is not so much that the Astracom 1000 lowers the price of getting on-line — it is more that it gives you more for your money.

It is strange that the QL, which on the face of it appears to be very well-equipped from the point of view of communications, has one bad point if you are interested in using the full range of communications services on offer. The QL has two serial interfaces which will work at all the standard data rates but not at split or dual speed. Most bulletin boards and messaging services, for example Telecom Gold, operate at 300 baud — 30 characters per second — for both transmitted and received data. That causes the QL no problem and if that is all you want to use then buy a modem, a connecting cable and a simple terminal emulator and you are set. On the other hand, if you want to make use of Prestel there is a small problem to be solved.

Prestel transmits data to the user at 1,200 baud — 120 cps — but allows the user to transmit back at only 75 baud. That dual rate of operation is sensible because, generally when using Prestel, you receive far more data than you want to send in return, but it is the cause of difficulty in getting the QL on-line. The QL serial ports can be set to any baud rate but they cannot send and receive data at different speeds.

Data rate

To enable the QL to support split-rate working you need to add a gadget which will change the rate at which data emerges from the QL. If the QL is working at 1,200 baud receive and hence 1,200 baud transmit to Prestel, the rate converter has to slow the 120 cps emitting from the QL to 7.5 characters per second before passing the data to Prestel. That data rate conversion is usually achieved by storing the data as it arrives in a special area of memory called a buffer and then feeding it out at a slower rate.

If the buffer becomes full the QL is asked to stop sending data momentarily but that is generally not a problem. Data rate convertors are usually incorporated into special QL modems but you can buy them as separate units — for example, see the Modaptor from Qcode, £39 including a terminal emulator.

The Astracom 1000 modem incorporates a complete microprocessor to enable it to convert the QL single data rate. Having a microprocessor inside a modem may seem like overkill but it is one way of providing a range of sophisticated features very easily. The Astracom 1000 is an intelligent modem which can respond to commands sent to it from the QL. It supports two types of command set, its own native mode commands and a subset of the Hayes standard commands.

Another advanced feature is that unless you specify a particular communications mode the Astracom 1000 will sample the incoming signal and determine how to set itself to communicate with the system you have dialled. In most cases the modem is auto-configuring and that is a feature normally found only on high-cost modems. Not having to worry about how to set baud rates and standards, coupled with the auto-dial facility, makes it one of the easiest modems to use.

On the subject of ease of use, connecting everything is simplicity itself. The modem plugs into the QL SER2 socket, leaving SER1 for a serial printer. The telephone line is connected via a cable with a standard BT connector and if you wish you can plug in a telephone handset at the back of the modem so that you can dial calls manually or just use the telephone normally.

Non-approved

The power supply is a separate unit and the modem runs off a safe 10V. That said, it is something of a surprise to discover that, at the moment at least, the Astracom 1000 is not BT-approved. There is a red sticker on the bottom indicating that connection to BT lines is prohibited and so if you use it and encounter difficulties with noisy lines it would be wise to ignore the advice of the manual about contacting BT for help.

The parallel printer port on the modem is a standard BBC-type 26-way ribbon cable. If you connect a printer

to the modem, so long as you are not running communications software, any data you sent to serial port SER2 will be transferred to the printer. If you are running communications software, the parallel port can be used to record incoming and/or outgoing data.

There is no doubt that the quality of the modem you use determines how much you can achieve but it is the quality of the communications software you run which determines how easy it is. The Astracom 1000 is complete with a very good communications package. It includes a Prestel emulator, ACPRESTEL, and a standard terminal emulator, ACTERM.

The main problem with comms software is the need to customise it to dial the correct telephone numbers. Most do so via a set of special commands but ACPRESTEL and ACTERM are customised via separate SuperBasic programs. ACPRESTEL is customised by using P_ACPRESTEL_BAS and selecting from the menu it offers.

Software

The customisation includes a printer port SER1/PAR1, the telephone number for Prestel, your ID and password, auto-dial, auto-logon, auto password and 10 Prestel page numbers which can be called automatically by pressing CTRL0-9. After customisation, using the Prestel emulator is simple — pressing F5 causes the modem to auto-dial and auto-logon if those options have been selected; F4 to print the screen; F3 to re-transmit the current page.

The terminal emulator is just as easy to customise, the only difference being that you can define 10 telephone numbers and there is no auto-logon procedure, and just as easy to use. There is a file transfer facility tailored to fit with Quill — you can receive text and have it stored on a Microdrive in Quill format or transmit pre-prepared _LIS files.

All-in-all, I found the communications software with the Astracom 1000 easy to use and just as powerful as more complex packages such as *Chitchat*. This combination of modem and software is suitable for the beginner but it has the versatility also to make it suitable for advanced projects such as running your own videotext bulletin board.

After this discussion of hardware and software it is worth outlining how much using a service such as Prestel is likely to cost. It is one thing to decide you can afford the one-time cost of a modem and a communications package but what kind of recurrent bills will you incur? The cost of using a service is difficult to quantify because it involves a number of components. In using Prestel there are four components to the cost:

A quarterly standing charge of £6.50 — £18 for business users.

The cost of using the telephone; by the end of 1986 all subscribers will be able to phone Prestel at local call rates.

The cost of being connected to the Prestel computer which is sixpence per minute between 8am and 6pm Monday to Friday, 8am and 1pm on Saturday and free at all other times, including public holidays.

A charge for each frame viewed. Most Prestel frames are free and many of those which cost money are only a few pence but there are exceptions; long-range weather forecasts can cost 50 pence.

In addition, you might have to take into account any subscriptions to CUGs you might have to pay. To use Micronet 800, the quarterly standing charge is £16.50 — £28 for business users — and there are extra charges for services such as sending a Telex message.

Belonging to a CUG such as Micronet 800 would add an extra £10 per quarter. If those figures seem high, notice that using Prestel for three hours a week every week represents a very high use of the service. One hour of Prestel time is sufficient to look at about 100 information frames. So the cost of using Prestel at cheap rate for one hour — 45 pence, plus any page charges — is very reasonable.

If you are worried that the phrase "plus any page charges" is hiding a big extra cost it is worth saying again that most pages are free and most of those which are not cost only one or two pence. Unless you are using some special information pages with a high page charge on a regular basis, it is unlikely that you would have a bill for more than a few pounds.

The Astracom 1000. More for your money.

Price of Prestel

To give some idea of the kind of bills you can expect from using Prestel consider two typical users, the frugal home user and the impatient business user. The frugal home user might dial Prestel for an average of three hours a week at the cheapest time. His bill per quarter would be: Quarterly standing charge, £6.50; Connect time charge, nothing; Local telephone calls — 39 hours at five pence for eight minutes, £14.63; Total, £21.13 plus any page charges.

The bill for our impatient business user dialing Prestel at peak rate for the same three hours a week is much higher: Quarter standing charge, £18; Connect time charge — 39 hours at six pence per minute, £140.40; Local phone calls — 39 hours at five pence for 1.5 minutes, £78; Total, £236.40 plus any page charges.

You can see that a business user pays about 10 times more for the same Prestel service as a home user. As the major component of this bill is connect time charges and peak rate telephone calls, the home user's bill could increase similarly by making use of Prestel at the costliest times.

The moral is that Prestel is inexpensive but telephone time and connect time charges mount quickly. Use Prestel in the evening and at weekends and spend as little time as possible browsing through pages and your bills will be low. I think Prestel is worth the cost. I am not so sure about the messaging services, but that is another story.

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TRANSFORMER

Ken McMahon reports on the Sandy answer to Thor — the Q-XT 640.

In *Sinclair QL World* three months ago we announced the arrival of the first QL upgrade machine, the CST Thor. At the time Thor was seen as a very necessary prop, a crutch to maintain peoples' faith in QL technology while providing time for a more exciting successor to be developed.

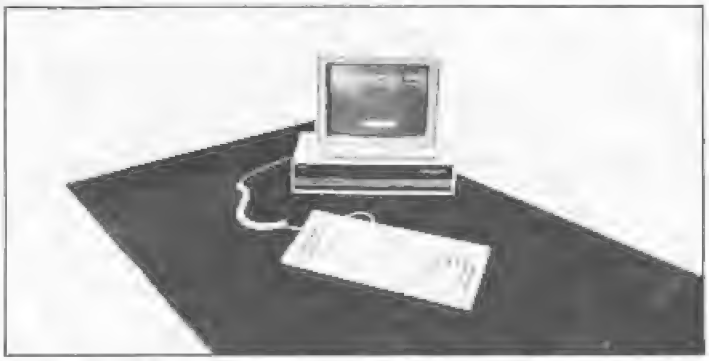
Since then the story has taken several turns but the goal remains the same — to produce a QL compatible super-micro based round a full 68000 chip. The appearance of the Q-XT 640 marks the intention of Sandy to be a serious contender.

Like Thor, however, the Q-XT 640 is more than just a stopgap. For QL owners, such machines can be viewed only as the ultimate peripheral, encasing every add-on you are likely to need in one neat box.

The Sandy approach does not depart radically from that description. Put simply, the Q-XT 640 is a processor box containing the QL board, power supply, three-way expansion port, mountings for twin 3½in. disc drives and one Microdrive. Attached to the processor box via a coiled telephone lead is the IBM PC XT-style keyboard.

That, of course, is just the bare bones.

The advantage of the kit philosophy is that no matter what stage of sophistication your system has reached, it can be accommodated easily in the Q-XT640 format. Of the three expansion slots, one is occupied permanently by the keyboard interface, leaving two free for, say a RAM card and disc/printer interface. Those with combined RAM with disc interface cards could make alternative use of the third port.



Sandy claims that any make of disc drive, once stripped of its case, will fit snugly into the housing and operate without problems, providing, of course, it did so initially. Additionally it is claimed that few difficulties will be experienced with the numerous RAM expansions available.

The challenge was immediately taken up and I disappeared, soon to return with a Micro Control Systems 512K expansion held aloft triumphantly. The external trappings were removed and the card inserted. Despite much switching on and off and numerous re-sets, the only thing to be obtained was a blank white screen. Naturally enough, the Sandy response was to cast aspersions on the quality of the MCS product.

To be fair, such improvised demonstrations rarely go according to plan and, should you have problems Sandy would be prepared to sort them out.

Those for whom the Q-XT640 would be a first peripheral, or even first computer, would avoid such problems. In addition to the QL, the complete kit includes twin NEC third height disc drives and The Sandy Super-Q-Board 512K RAM expansion and disc interface.

The new version of Super-Q-Board has been considerably enhanced by the addition of Tony Tebby's Supertoolkit 2. The boot up has been arranged to link in the Toolkit commands only when required so that software which will not run with toolkit can be used.

Sandy's approach, whilst not as ambitious as that of CST, might at least be said to be more pragmatic. The inclusion of a Microdrive is sensible and will probably hold more sway with prospective buyers than the 20 Megabyte Winchester option offered by Thor.

Without getting too far into the business of blow by blow comparisons (for Thor details see *Sinclair QL World* July 1986) there is little to choose between the two on price. The dual disc Q-XT640 costs £699 — exactly the same as the Thor equivalent except that VAT is included in the former.

Thor's ICE front end plus the Xchange version of the Psion programs give it the edge on software. In terms of hardware there is less to choose between them. Sandy anticipate being able to offer a mouse, designed by Tony Tebby, in October.

The deciding factor for most people will probably be whether they already own a CST or Sandy peripheral. For Super-Q-Board owners the Sandy machine is the obvious choice. Whichever way you look at it, the fact that there are now two upgrade options for QL owners is an encouraging sign.

Information

Q-XT640 — specifications

Dimensions: 485mm×250mm×110mm
Weight: 5kg
Power supply: 60 Watt switchable 110/220 Volts.
Keyboard: IBM PC XT style. 84 full travel
Sculpured keys. Standard QL keys plus ten function keys, numeric/cursor pad, delete, and scroll/lock.
Prices: DIY kit including processor box, cables, interfaces and keyboard £259 including VAT.
Complete ready-built system with one disc drive and new QL board £654 including VAT, dual disc version £699.
Sandy will fit a Q-XT640 upgrade for QL owners, price on request.
For further details contact:
Sandy (UK) PCP Ltd
93 Chiltern Avenue
Bedford
MK41 9EH
0234 219814

Profile on

PYRAMIDE

8, rue du Ruisseau · 75018 Paris
Tél. 42.54.39.67

In the first of our occasional company profiles Ron Massey talks to the people behind the prolific French software house, Pyramide.

Daniel Purlich, founder and managing director of the French QL software house Pyramide, developed a serious initial interest in microcomputers in 1980, as a result of buying one of the first Sinclair ZX-81 micros available in France.

Working in professional data processing for more than 10 years with companies such as Control Data, ICL and other French software houses has strongly influenced his background. Other qualifications, including a French masters' degree in electrical engineering, have been brought to bear in practical day-to-day business applications.

More specialised experience was gained when, at the end of 1984, he was asked to manage Direco, the French distributor of Sinclair products. Plans were formulated during his one-year stay there for a new company, Sinclair France which, for a variety of external reasons, failed to materialise. In his capacity as managing director he succeeded admirably in organising and overseeing the launch of the QL in France.

Located just below the Sacre-Coeur in Monmartre, one of the few quiet areas of Paris, Pyramide opened for business in November, 1985. Because of the Mexican origin of Purlich's wife, the name planned originally for the company was Mayasoft.

Commenting about the rather esoteric manner in which creative thought processes tend to flow, Alexander Gassman of Pyramide, one of the two authors of *Nucleon*, observes: "The Mayas invented the concept of zero as a valid number it is mainly because of its numerical significance, along with Purlich's wife's origin, that the Pyramide logo reflects a more Mayan than Egyptian influence."

Pyramide Soft, as it is known officially, now includes a full-time staff of five, with more than 20 programmers throughout Europe whose catalogue of backgrounds and qualifications reads more like a League of Nations craft guild than a software house.

Each member of the Pyramide team has taken their particular range of skills and interests into program production. A typical representative selection of the development team available includes members from the U.K., France, the Netherlands, Germany and Belgium.

Collectively, various staff specialities have gone into the development of the Pyramide current and planned range of programs. Personal expertise of the programmers has provided the professional polish observed in *QL Peintre* and *Wanderer*, whose authors, Mick Andon and Langlois, respectively, have a highly-developed professional musical and artistic background.

Tridim, soon to be released in the U.K., was written by Michel Meunier, a pilot; *Othello*, by Henri Picot, a craftsman; *Nucleon* and *QL Remember*, the second of which will also soon be available in the U.K. by Alexander Gassman and Fran Moerel, both students; *Vroom* by Daniel Macre, systems manager for software support at DEC France; *Mortville Manor*, a large systems programmer; and *Logo*, also soon to be released in the U.K. by a schoolteacher.

Problems, typical to the development of almost every program, along with the evolution of an idea, can best be exemplified by the story of *Nucleon*. Gassman, accomplished on the keyboards of QL and piano, and Fran Moerel, both of whom are what could be described as competent computer freaks, soon after receiving their QLs in November 1984, learned to appreciate the graphics power made available to them and began experimenting in earnest.

"The concept of artificial intelligence has always fascinated us", Gassman recalls, "and, before we knew it, we had some programs which generated other programs."

Developed as a central suite of programs from which other programs could be produced, Nucleon evolved gradually into something resembling its present toolkit form. The complexity of the system, coupled with the fact that Nucleon had been written originally for an MG ROM, produced a few memorable headaches.

Relating the tribulations of the early

Pyramide HQ in Montmartre.

versions of Nucleon, Gassman recalls: "Fran wrote a new SuperBasic extension he called RESET which was intended to be used in certain parts of our program.

"One of the modules of Nucleon on which I was working, *Maestro*, also used RESET as a keyword but for an entirely different purpose. When the two were combined, his re-set overrode mine and, as a result, every time Maestro was run, the system would dissolve into a multi-coloured screen display. Another problem arose when users found great difficulties when they tried to convert Nucleon from microdrive to disc.

"Only 10 of the early versions were despatched before we discovered the fatal bugs. Those few programs were replaced with completely debugged versions and will now work with any variety of QL configuration.

"From the beginning of Nucleon, once the project began to take a direction we decided to make a coherent suite of programs which would also include a number of separate additional and useful utilities which end-users could use in their programs.

"Because of its outstanding ability to improve the handling of data processing and graphics, we also decided to use Digital Precision's *Supercharge* when and wherever possible."

Stories from the early days of Pyramide development reflect the bitter-sweet associations which often seem tied inevitably to the evolution of the QL. Discussions were initiated between Pyramide and Sinclair Research, at a time when the Alan Sugar empire had yet to make its appearance over the horizon, regarding the possibility of bundling *Wanderer* with the QL, as an outstanding representative of the QL handling of fast graphics.

Initial quantities were to be about 10,000 units and if the early discussions in October, 1985 had proved fruitful, the timing would have placed Wanderer in Dixon's QL package shortly after. Rather sadly, the project was abandoned at the last hurdle, when Sinclair Research began developing priorities in other directions.

The present QL user base in France is estimated at about 9,000. Because of that, and due to the high cost of program development in terms of cost and time, Pyramide has concentrated primarily on product export rather than depending solely on local support in France. A small shop, however, is maintained where QL enthusiasts can gather to discuss and have demonstrations of any of the company's comprehensive range of products.

Gassman adds: "When we started we had received about 30 projects for the QL from freelance programmers, many of whom are still in close contact with us. Some of those programmers are working on new and exciting projects which we will be considering for new releases.

"Six months later, we are publishing 13 titles in French and six in English. All have received good acceptance from the press and, more important, from the end-user. At the moment we have a mailing list of about 1,500 users who are well satisfied with both the QL and our services and products."

The sole Pyramide U.K. agent, Rio Promotions Ltd, has had years of association with members of the French-based company. Rio Promotions, although a relative newcomer to the microcomputer business, has also had many years of experience of successful trading in an international environment.

Although sales have been confined primarily to mail order to the present time, plans are being made to establish a dealers' network, which can only benefit everyone concerned.

Looking to the immediate future, two titles which are being considered for immediate translation into English are a three-dimensional wire-modelling program called *Tridim* and a semi-intelligent, multi-page, multi-tasking notebook *QL Remember*. Due for release on September 15, another Pyramide release, *Graphic Toolkit*, will be worth serious examination. Other releases planned between October and the end of the year are a specialised graphics toolkit and another game.

Not surprisingly, the Pyramide best-sellers, so far, have been led by Wanderer, closely followed by Nucleon and QL Peintre. Looking through its extensive catalogue, well-known British names such as Digital Precision, Talent, Eidersoft, Miracle, Qjump and Metacomco, companies which Gassman describes as "very professional", figure strongly in the French imports line-up.

Always encouraging new authors, Pyramide has a standing policy of accepting software from programmers world-wide for possible inclusion in the already extensive range provided that, as Gassman puts it, "programs are of a suitable quality."

Specialising solely in 68000-based technology, planned product developments will encompass any future QL derivatives; plans are also being initiated to develop programs for the Atari ST range.

Refinements to the current range of products obviously will continue. QL Peintre, says Gassman, "will eventually be made compatible with the Eidersoft mouse. I had a chance to use one with the MiceART system when I was in England and the mouse system is very impressive. Being able to draw in a freehand manner, somewhat like using more conventional artists' tools but with the additional power of the QL, and all that can be done with computer-generated graphics, has a great deal to commend it."

By sheer weight of the dynamic professionalism incorporated in company policies, which is also reflected in the polish of the products, Pyramide can scarcely do anything but make a lasting impression on the computer industry, setting new levels of standards by which other companies' new products are likely to be judged, in terms of presentation and function.

Daniel Purlich and some of the Pyramide team

Taking what must be an exceptional approach, considering the attitudes often seen outside France to the production of new software, Purlich observes: "There is one thing I want to emphasise; at Pyramide many programmers co-operate for one particular program, even if the concept and the bulk of the programming has been done by one person."

Another unusual approach towards encouraging authors to write for the QL is that, as Purlich adds: "All commercial software houses are welcome to use any Nucleon routines with no restriction or licence fee. So far as we are concerned, the more software there is for the QL the better it will be for everyone."

BETTER BASIC

Mike Lloyd shows the way to improved programming.

Like all other Basics, SuperBasic has an INPUT command which allows information to be entered while a program is running. It is an extremely useful and widely-applied command with a format which varies little across the range of Basic dialects and which typically takes the form:

100 INPUT "prompt", variable

Essentially, an INPUT command merely solicits information from a source, usually the keyboard. The programmer sets up a variable and asks the user to give it an appropriate value. In use, a flashing cursor shows where the input is expected and anything typed in is shown on the screen and passed to the variable when ENTER is pressed. The optional prompt string is a neat idea to avoid preceding INPUTs with PRINT statements to explain what the INPUT is for, but it is not an essential part of the command.

Programs can all too easily be brought to a halt or made meaningless by careless mistyping or by misunderstanding the prompt. For example, if an INPUT statement read:

100 INPUT "How many cars do you own?", cars

The written word 'one' might be entered rather than a figure one. The program, expecting a numerical input, would crash. Less fatal, but still annoying and untidy, is the programmer's total lack of control over the length of input. Carefully-designed screens can be ruined by input which over-runs a line unexpectedly or which obliterates other information.

INPUT, then, is a vague command which does not allow the programmer sufficient control over the information entered. To use it in a serious program would be against the principle of not allowing the user to do anything which the programmer did not forcsee and for which the program does not cater.

The obvious way to remove the disadvantages of INPUT in SuperBasic is to replace it with a user-defined routine. Two routines are needed to cope with the very different requirements of numerical and string input. This month's feature is devoted to a string input function; the more complicated numerical input function will be tackled next month. Both routines provide total control over what and how much is input, as well as giving other incidental benefits.

The precise objective of this month's routine is to allow a user to input information in the form of a string with a specified maximum length, using only characters determined by the programmer. All the decisions taken during the design of the routine were made with this definition in mind.

First, it was possible to write the routine equally well as a user-defined procedure or as a function and a decision about which method to adopt was necessary. INPUT is a procedure but an unusual one because procedures normally do not affect the values assigned to variables. It was, nevertheless, decided that the routine would be a function and that therefore a call to it would take the form of:

605 examples = INFO$ (2, 5, 0, 12)

rather than the SuperBASIC equivalent:

605 AT#2, 5,0: INPUT #2, examples$

The optional prompt string offered by SuperBasic INPUT was discarded for the routine because optional parameters are not allowed in user-defined structures and because prompts can be provided by a PRINT statement. Nevertheless, the routine has to mimic many of the other features of the INPUT command. It must show where on the screen input was expected, detect keypresses and take appropriate action. Action includes displaying characters on the screen, deleting unwanted characters and assigning the entered string to the appropriate variable. Above all, the routine has to be idiot-proof.

The parameters passed to the function are the minimum required, comprising:

Chan — a channel number.
Ypos, xpos — print co-ordinates for the first character.
Max — the maximum number of characters allowed.

Three local variables are required within the function, as follows:

Y$ — a string in which the input is stored.

```
100 DEFine FuNction INFO$ (chan, ypos,xpos, max)
110 LOCal y$,loop,key
120 y$ = ''
130 REPeat loop
140   AT#chan, ypos,xpos
150   PRINT#chan, y$;FILL$('_',max-LEN(y$))
160   key = CODE(INKEY$(-1))
170   SELect ON key
180     = 9, 10: REMark ENTER/TAB keys
190       IF LEN(y$) >0
200         AT#chan, ypos,xpos+LEN(y$)
210         PRINT#chan, FILL$(' ',max-LEN(y$))
220         RETurn y$
230       END IF
240     = 27: REMark ESCape key
250       RETurn INFO$(chan,ypos,xpos,max)
260     = 194: REMark delete character
270       IF LEN(y$) >0: y$ = y$(1 TO LEN(y$)-1)
280     = 32 TO 127: REMark characters
290       IF LEN(y$) <max: y$ = y$ & CHR$(key)
300   END SELect
310 END REPeat loop
320 END DEFine INFO$
```

KEYWORD OF THE MONTH

BLOCK

BLOCK is a keyword which allows rectangles of colour to be placed in any screen or console area. Its syntax is straightforward, typically:
BLOCK # channel, width, height, xpos, ypos, colour

The optional **channel** value chosen should be one representing a screen window but Qdos ignores BLOCK commands sent to other devices.

The **width** and **height** of the block are measured in pixels. Qdos ensures that blocks are of equal size whether in Mode 4 or Mode 8.

The co-ordinates **xpos** and **ypos** refer to the top left corner of the block related to the window origin in the top left corner. That contrasts with commands such as LINE and CIRCLE whose co-ordinates are measured from the bottom left of the window.

If a block cannot be displayed completely on the screen because of its size or position, an error will occur. The remedies are to move the position of the block or reduce its size.

The **colour** parameter can be any number between 0 and 255. Fractions are rounded to the nearest integer. Alternatively, up to three colour values can be specified, representing the main colour, contrast and stipple pattern, as follows:
BLOCK 50, 50, 105, 40, 2, 5, 1

This example will print a block of red with cyan horizontal lines.

Because BLOCK parameters relate directly to pixels it is a rapidly-executed command. Listing one contains two FOR . . . NEXT structures which perform the same task in different ways. Running the listing should prove that BLOCK works some three times faster than the equivalent LINE statement. Of course, BLOCK cannot produce sloping lines or draw from off-screen co-ordinates, but it is nevertheless an efficient alternative to LINE in many circumstances.

BLOCK is the only command which uses the pixel co-ordinate system directly relative to the window origin. It is not really an odd-man-out because PRINT, CLS, PAN and SCROLL are related to the window pixel system and WINDOW is related to the display pixel system.

The close connection with PRINT co-ordinates can be useful. Characters can be highlighted by selecting OVER −1 and placing a block of contrasting colour over them.

```
200 CSIZE 2,0: CLS
210 AT 5, 10: PRINT
"HELLO"
220 OVER -1: PAUSE 50
230 BLOCK 60, 10, 120,
50, 3
240 OVER 0
```

The position of the block is worked-out by multiplying the AT co-ordinates by the side of each character measured in pixels. The measurements are listed under CSIZE in the Keywords section of the User Guide. The size of the block is found by a similar calculation relating to the length of the string being overpprinted.

```
100 FOR x = 1 TO 50
110 LINE 0, x TO 100, x
120 END FOR x
130 FOR x = 1 TO 100
STEP 2
140 BLOCK 268, 1, 0,
200-x, 7
150 END FOR x
```

BLOCK can also replace CLS and, to a degree, RECOL. Assuming TV mode window co-ordinates, Window 1 can be cleared by:
10 BLOCK 448, 200, 0, 0, 5

That is not much of an advantage over CLS but if OVER −1 was selected the whole window area would be re-coloured almost instantly. Type-in listing three and compare the speed of colour change with the snail's pace of RECOL. It assumes that TV mode has been selected.

```
300 PAPER 0: MODE 0: CLS
310 FOR x = 1 TO 6
320 INK x: FILL 1
330 CIRCLE x*28-18, 50,
50, .2, 0
340 FILL 0
350 NEXT x
360 OVER -1
370 FOR x = 0 TO 255
380 BLOCK 448, 200, 0,
0, x
390 PAUSE 10
400 END FOR x
```

BLOCK, then, is not only useful for producing rectangles of colour; it can be used to draw lines quickly, highlight text and re-colour screens almost instantly. The command parameters shown in the User Guide can be extended to include up to three values representing colour, contrast and stipple.

Loop — a REPeat structure identifier.
Key — a variable for the ASCII codes of pressed keys.

The variable and parameter names chosen should ensure that the routine is readable with the minimum of extra annotations. The string variable y$ is declared as a null string by the first executable statement in the function. The basis of the routine is a loop which is circled each time a key is pressed. At the beginning of the first pass, a string of underline symbols the length of the maximum allowed input is printed.

That obviates the need for a cursor to show that input is expected and has the advantage of showing the user immediately the length limitation of the input. In any case, a flashing cursor is not easy to program in Basic, especially in Mode 4. As characters are added to y$ they replace the underlines beginning from the left. This form of input display is sometimes described as "hangman style", after the children's game.

The keyboard is read using an INKEY$ statement. The ASCII code is obtained rather than the character so that it can be used in the subsequent SELect statement, which does not work with string or integer variables. The SELect structure identifies five classes of character input.

The first class is made up of the ENTER and TAB keys, both signifying that input is complete. TAB was included because many professional programs allow users to move between input areas by pressing TAB; this routine is therefore compatible with other programs with which its users might be familiar.

When either key is detected the routine tests the length of the string y$. If it is empty the keypress is ignored, but this feature could be removed by deleting lines 190 and 230 should null strings be acceptable in the program. Assuming there is a valid input, the screen is tidied by removing any remaining underlines and then y$ is returned to the variable designated by the calling statement and the input is complete.

The second class has only one member, the ESC key. It is used in a somewhat unusual way in that it clears the whole input area to allow the

BETTER BASIC

user to start again. This might need explaining either in documentation or by a screen prompt. It works by calling the function recursively as many times as might be necessary.

Also in a class of its own is the "delete" combination of CTRL and the left cursor key, ASCII code 194. A test is made to see that y$ has characters to remove before it is truncated to remove the last character, which will be replaced by an underline at the beginning of the next pass of the REPeat loop.

The largest input class consists of the valid characters, as defined by the programmer. In the listing, all the characters in the ASCII table between the space and the copyright sign are valid, but line 280 could be changed to indicate any subset of the QL characters. Valid characters are added to y$ provided that the maximum string length is not exceeded.

The fifth class of characters is noticeable only by its absence; any character not included in the foregoing classes is ignored and has no effect on the program.

That completes the routine. Once typed-in and tested, it should be re-numbered with high line numbers to allow it to be merged easily with programs in which it will be used. Some brief examples of its use in a program are:

```
460 string$ = INFO$ (1, 3, 10, 6)
900 DIM a$ (5, 10)
910 for x = 1 TO 5
920 a$ (x) = INFO$ (2, x,0,10)
930 END FOR x
750 AT 5,0: PRINT INFO$ (0,0,0, 12)
```

The function could be developed further, for instance by adding BEEPs to indicate various keypresses — not forgetting one for invalid characters. Or it could be re-written to accord with a different set of criteria and assumptions, but it shows how SuperBasic can be used to write elegant, self-documenting and concise code. That is what this series is all about.

SOFTWARE FILE

The Q-XT640 upgrade can turn your QL into something unrecognisable from its former self. Ken McMahon reports.

The Lost Kingdom of Zkul

Talent
£14.95

The kingdom of Zkul is a paradise for any fan of *Dungeons and Dragons*. Populated by unkempt dwarfs and sorcerous wizards, the ancient kingdom offers hundreds of locations and ample opportunity to test your adventuring skills.

Your task is to search for the lost treasures and discover the last precious secret, guarded by a wizard, avoiding the perils that are thrown before you.

Features such as real-time and a notepad facility which allows you to leave a short message on a saved game, provide a much greater challenge *and* indicate how well-written the program is.

Mortville Manor

Pyramide
£19.95

Don your deerstalker and clean your magnifying glass because a heinous crime has been committed at the lonely French chateau of Mortville. As private eye Jerome Lange you have to unravel the mystery of "who killed Julia Defranck", without becoming a victim.

Living at the Manor are various relatives of the murdered Julia who know the identity of the villian but are reluctant to tell tales. Rather like *Cluedo*, you have to search the numerous rooms of the expansive house and question the suspects as you find them; in that task you are aided by a very good vocabulary and a feature which allows you to look in the furniture placed round the house.

Excellent graphics and a comprehensive vocabulary make *Mortville Manor* a delightful game to play, with the only criticism concerning the time taken to paint the various screens.

West

Talent
£14.95

In true spaghetti Western style you are the man with no name, armed only with a pack of cigarillos and a six-shooter, wandering the badlands in search of a band of debauched bank robbers.

The search naturally is hampered by a variety of things ranging from rattlesnakes to Indians and varied natural hazards, making the job of enforcing the law a lonely and difficult one.

As in the best westerns, your only companion is a trusty steed — not the bowler-hatted variety — who has the annoying habit of wandering off.

Talent has injected plenty of humour into the game, playing on the Hollywood conventions of the Wild West, making *West* lively and entertaining providing a welcome change from the archetypal adventure game.

Fantasia

S & B Software
£14.95

This text-only adventure plays on the popular setting of an anarchic and hostile land. You adopt the role of a stranger in this land, populated by a race of warriors who are at war with your country.

The aim is to assassinate the tinpot leader, known as the Emperor God Hazaran, and bag any loot you happen to find.

The vocabulary is fairly basic and the speed of operation tends to be slow, but in true *Fantasy* tradition there are some original and imaginative creatures such as the Manic Bagpipes.

Aquanaut 471

Microdeal
£19.95

One thing you can say about QL adventures is that there is certainly a diversity of scenarios. *Aquanaut 471*, not surprisingly, is set beneath the ocean.

The inhabitants of Trident Dome have signalled for help and you must travel to the sub-aquatic city and investigate. The game is a mix of graphic adventure and arcade screens, the latter consisting of fairly basic though sometimes reasonably difficult mini-games.

Like most of the Microdeal range, Aquanaut is fairly basic in many respects. Having said that, the unusual setting and lively graphics combine to make it a very enjoyable game.

Tycoon

Newtech Publishing
£14.95

Tycoon is a strategy game for up to six players based on the world of finance. The object is to make money by solving crossword puzzles and then selling the words to a bank, thus increasing your capital. For a price you can buy random or specific letters to help with the more difficult puzzles.

Written by Victor Serebriakoff, president of Mensa, the game re-creates the challenge and risk of the financial world and proves a sound investment.

Bridge Player

CP Software
£14.95

The QL version of bridge is designed not only as a game but also as a game simulation to "practice the bidding and play of contract bridge." All the features you would expect are present, such as the re-bidding and replaying of hands.

Sadly the avid bridge player, however competent, will find the program inadequate. Good players will find the standard poor, while inexperienced players will find all the features missing which they need to improve.

Dragon-hold

Rubicon
£19.95

Dragonhold is what is known as an arcade adventure. All the usual adventure puzzles are there to be solved but to find them you must

manipulate a little man through a maze.

A central window depicts the little chap's progress through the caverns and six subsidiary windows provide information on such things as weapons in your possession, other creatures in the immediate vicinity and the strength of your various attributes. They number among them charisma, intellect, aggression, strength and psi power.

When confronted by an adversary, the idea is to assess your chances of success in combat by comparing the relative attributes. You do not have to fight; talking to the creatures may prove more fruitful. Either way, if you are to be successful in your quest for the Elixir of life, you must stay on your toes, as well as making all the correct decisions.

The Pawn

Rainbird
Price to be announced

The Pawn is a light-hearted spoof on the familiar goblins, dwarfs and wizards type of adventure. You enter the politically-unstable land of Kernovia where it is your objective to discover who assassinated Queen Jedah.

What makes the Pawn such an impressive adventure is the complexity of the context handling parser. This allows big commands to be understood and acted upon.

The Pawn is a lively adventure with its light-hearted nature making it more entertaining but the QL version is a text-only adventure, unlike the Atari ST and Amiga version for which you may have seen screenshots.

Scrabble

Virgin Games
£14.95

Scrabble is a classic board game and consequently I think it is a pity to see it on a computer. The object, for those who did not know, is for each player to construct words from a rack of seven letters, using at least one letter already on the board. Points are gained from the value of letters used and their position on the board.

While it is an accurate version of the board game there are several disadvantages. A good example is the fact that the other players can see your letters displayed on the screen, something which the manufacturers claim does not effect the game but if that is the case, why is it in the original rules?

I did not enjoy Scrabble largely because the computer seems unnecessary and detracts from the fun. What happened to cheating when taking your letters out of the bag?

Squadrons

Peakcrown
£14.95

Squadrons is a strategy game in which you control and direct Britain's wartime air defences. You must scramble squadrons of fighters from bases all over south-east England to meet the airborne Nazi threat.

There are a hundred and one things to do in the day of a wartime air controller. In addition to giving the command to scramble, you must set aircraft on the correct course and maintain radio contact, providing course corrections and new orders.

Should any of the German bombers manage to penetrate your defences, the air raid warning must be sounded and the anti-aircraft batteries alerted.

Those interested in war games will find Squadrons an authentic simulation; for others it will provide enjoyable yet testing entertainment.

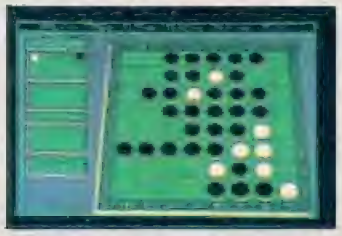
Othello

Rio Promotions/Pyramide
£14.95

Othello is a version of the board game played on an eight by eight grid. The game is for two players and the object is to trap lines of your opponent's pieces between two of your own, thereby converting them to your colour.

The board can be displayed in either 3D or as a plan view and other features of the screen display include a timer, move number, current score and a list of possible moves.

There are nine levels of



difficulty with the computer proving to be a highly-competent adversary.

Area Radar Controller

Shadow Games
£12.95

To control any number of aircraft between 10 and 69 requires a sharp mind and nerves of steel. I possess neither, which may account for the poor showing I made in this game.

The screen represents air space which contains within it nine air traffic routes and two airfields. As the Area Radar Controller it is your task to guide the pre-selected number of aircraft safely to their respective destinations.

At the bottom of the screen is a command line which allows you to

communicate with the aircraft but more often than not they do not respond, making you totally incapable as they plummet to certain destruction. After several attempts to master the game I failed and felt little inclination to try again.

Psion Chess

Psion
£19.95

Probably one of the best chess programs available on any micro, it became the world microcomputer chess champion shortly after its launch.

Apart from the high standard of play, the other outstanding attribute of this program is the suberb 3D screen display. It is without doubt the best display you will find on any chess program and dispenses altogether with the need for a board and pieces.

There are 14 levels of play, the higher the level the longer the computer takes over its move. On novice level the computer plays more weakly if it is winning and, at the other end of the scale on level 13, the computer will work on its move until you tell it to stop. Additional features include on-line help, position analysis, hints, replay, save game, and two-player and print options.

Super Back-gammon

Digital precision
£12.95

Backgammon is probably the ideal game for those who find chess slightly too much of an intellectual challenge. The main criticism of the Digital Precision version for the QL, however, is that its performance leaves much to be desired. A reasonably competent player should not have much difficulty beating the program consistently on all but the highest levels.

Nonetheless, the game probably has much to offer the beginner or inexperienced player. All the rules have, amazingly, been crammed on to the cassette inlay and a more comprehensive set is provided on a Quill file.

The display is adequate, though with a little more thought it could have been better. For example, the last move is displayed — for about one-hundredth of a second, not the most useful of features.

Super Backgammon is an adequate rendition of the board game and, in fact, the only version available for the QL. At £12.95 it is not a bad buy but it could easily be improved.

QL Fictionary Wordhoard

Sinclair
£14.95

There are very few word games for the QL and this package is certainly the best in my opinion. *QL Fictionary* is a cross between *Call My Bluff* and *Trivial Pursuits* and can be played by up to four players. The QL presents you with a word and four possible definitions, asking you to decide which is correct.

With a memory of more than 2,000 words, the game offers a challenge to even those with a substantial vocabulary and provides a great deal of general knowledge at the same time.

The object of *Wordhoard* is very different and requires the player to construct as many different words as possible from one selected by the computer. There is

a time limit of three minutes, after which time your words are checked against the game's 18,000 word dictionary to calculate your score. As with Fictionary, this game is very well-written and enjoyable to play.

Executive Adventure

Gemini Marketing
£12.95

A text-only adventure in which you must climb the ladder of corporate success from a lowly tramp to company director.

The idea, as such, is novel and amusing, but the prose lacks colour and so, after a time the game loses its sparkle and falls rather flat.

Information

C.P. Software: 15 Despard Road, London N19 5NP. Tel: 01-272 2918.

Digital Precision: 222 The Avenue, London E4 9SE. Tel: 01-527 5493.

Gemini Marketing: Gemini House, Concorde Road, Exmouth, Devon EX8 4RS.

Microdeal: Micropost, 41 Truro Road, St Austell, Cornwall PL25 5JE. Tel: 0726 68020.

Newtech Publishing: 8 Ferge Court, Reading Road, Yateley, Camberley, Surrey.

Peakcrown Ltd: 4 Beeby Road, Scraptoft, Leicestershire LE7 9SG.

Psion Ltd: Psion House, Harcourt Street, London W1H 1OT. Tel: 01-723 9408/0553.

Pyramide: c/o Rio Promotions Ltd, Dept QL, 28 Waverley Grove, London N3 NPX. Tel: 01-349 2764.

Rainbird: 64-76 New Oxford Street, London WC1A 1BU. Tel: 01-631 5168.

Rubicon: 11 Bannerdale Road, Sheffield S7 2DJ. Tel: 0742 583665.

S+B Software: 20 St Nicholas Street, Diss, Norfolk.

Shadow Games: 1-2 The Cottages, Maidenhatch, Tidmarsh, Nr Reading, Berks RG8 8HP.

Sinclair Research: No longer exists but licensed games can be obtained at most good stores.

Talent Computer Systems: Curran Building, 101 St James Road, Glasgow G4 0NS. Tel: 041-552 2128.

Virgin Games: 2-4 Vernon Yard, London W11. Tel: 01-727 8070.

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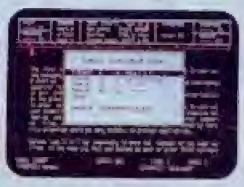

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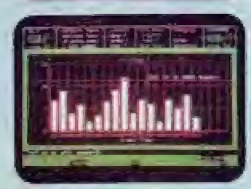

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comprises calculations for single or double-skin wall — or columns — of masonry construction in accordance with BS 5628, Part 1 and includes amendments 1 and 2.

the programs for configuring the output to suit various printer configurations with regard to transmission rate, port definition, preamble codes and page

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Settlement Analysis calculations are based on Boussinesq's equations of stress in conjunction with specified co-efficients of volume decrease at various strata to tabulate settlement at each intersection of a user specified grid.

The calculation starts at the grid origin and, when a point is completed, the display indicates values of *x* and *y* of the last point calculated, the stress/settlement for the relevant point and the anticipated run-time. The information is updated at the completion of each intersection point.

Customising routines are included in each of

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It might be worth pointing-out that complex calculations, such as those used for Settlement Analysis where 500 intersections or so, from a user specified grid, can take 12 hours or more to complete, but run-time can vary dramatically from seconds to weeks.

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UTILITY FILE

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One of the little utilities no SuperBasic programmer should be without. Data Management's *SButil* is an aid to narrowing any area where programming faults are occurring while the program is running.

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A facility is included for regulating SuperBasic execution speed, throttling it down to a snail's pace time-share priority value of 1, to the plain greedy no-share priority value of 127 — SuperBasic defaults to a value of 32 — by typing-in: EDIT 1,001 and, like magic, the normally high-speed processes are slowed to a crawl. EDIT 1,1127 has the opposite effect.

Information

Data Management, Clark House, The Village, Haxby, York YO3 8HU. Tel: 0904 760 351.

Superplant Software, Llangeitho, Tregaron, Dyfed, Sales SY25 6QG. Tel: 097 423 223.

Co-opSoft Ltd, 10 Trangle South, Bristol BS8 1EY. Tel: 0272 22223.

organising the comprehensive and extensive horticultural database library on which the system is based.

Designed for the use of amateur gardeners, landscapers, foresters, farmers and professional nurseries alike, this inexpensive database program will enable you to select the most suitable plants, according to your preferences and their requirements, provide a printed list of the results of a search, all with the least amount of effort.

Four separate databanks, covering more than 700 plants, will enable you to organise a search for particular plant types according to the soil, site, colour of foliage or flowers and light availability.

A breakdown of the library, to which users may add plants of personal interest or preference, consists of 185 of the most common house plants, 208 of the most commonly-obtainable wild flowers, 297 of the most common shrubs, trees and climbers, and 54 of the most commonly-available fruit trees and bushes.

In common with all well-organised databases, searches of the databank may occur by selecting a number of parameters which will be common to any or all the plants required for a particular site. Reports of the searches may then be viewed on-screen or printed.

The main menu gives access to the various options for selection, display, locating and printing the various files. Choosing the Selection Option, you are given further choices for Enquiry, where plants are chosen for a certain range of characteristics, Habitat for making a selection of plants for particular site conditions, or Planner, which selects plants by one feature.

After the selected files have been organised, you may choose to have a Report — either screen or printer — for displaying all the facts about each plant in the file; Name for displaying the names of all of the plants in category chosen; Features for displaying the plants alongside their main shapes, uses and special habitat features; or Labels, which will either display or print the names contained in a file selection in label format.

Superplant. Green fingered software.

Data modules provide information pertinent to each plant group. The fruit-bearing module supplies additional information, such as whether the fruit is for eating or cooking, typical harvesting times, as well as a concise description of colour, taste and texture.

The flower modules include information regarding leaf colour and type, flower season, colour, distribution and configuration. Requirements of temperature, light, and moisture are also detailed.

Routines included in the system enable searches to be made by parameters other than just for garden planning. As one example, if conservation is of particular interest, lists produced from organised file searches may be made for a selection of plants which will attract birds or bees.

Other searches of the database can produce recommendations for plants used for developing nature trails, as well as hedging and windbreak plants which are highly salt-spray tolerant.

It is not surprising that Superplant has had sales from all over the world. Like the majority of Achive-based systems, Superplant may also be taken over to the Merlin or OPD micros, as well as IBM systems. As an additional bonus, if you are a keen gardener, Superplant is less expensive than the majority of the better horticultural reference books.

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Co-opsoft Ltd
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These programs from Co-opsoft are a representative part of its range of software providing CAD for the structural engineer. Each program utilises relevant incorporated standards reference tables, permitting completion of complex analytical calculations of the many components comprising building structure.

Single Span Beams analyses parameters and tabulates calculations for the full range of UB, UC and joist section steel beams — grades 43, 50 and 55 — to British Standard 449 and timber beams and joists to CP112.

Required input includes beam span, effective length and up to nine elements of each type of load, which may include uniform — or uniformly varying — distributed loads over any portion of the span, localised point loads or fixing moments occurring at the supports.

A sequence of calculations will tabulate positive or negative figures for the maximum bending moment on the span and the shear values at the ends of the span.

Provided the input complies with the permissible stress and slenderness criteria, a screen/printer tabulation is produced detailing the serial size, the actual and permissible bending stresses, the C1 values for buckling and bearing, the shear capacity of the beam web and the deflection ratio related to the span of the beam. If none of the rolled sections complies with the BS for the input requirements, a screen message "out of range" is indicated.

Timber beam and joist calculations are tabulated for load capacity, actual and permissible bending stresses, shear capacity of the section and the span to deflection ratio.

Columns to BS 449 is used for the selection of minimum weight rolled steel section for columns subject to compression and bending about either or both axes. Calculations incorporate the effective lengths about the Y-Y and X-X axes, the bending moments in kNm on both axes, axial load in kN, with or without wind stresses and includes options for grades 43, 50 and 55 steels.

Design to BS 5628

comprises calculations for single or double-skin wall — or columns — of masonry construction in accordance with BS 5628, Part 1 and includes amendments 1 and 2.

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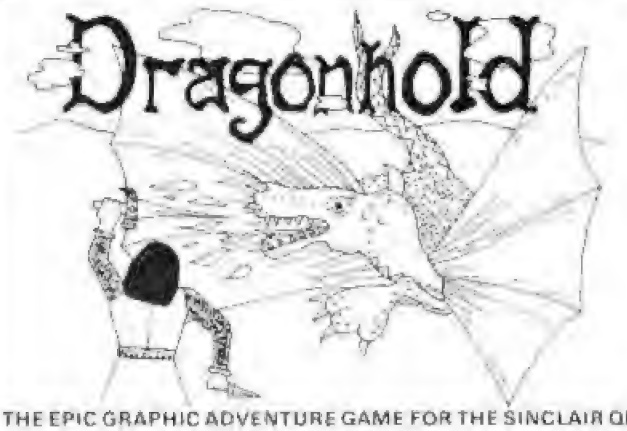

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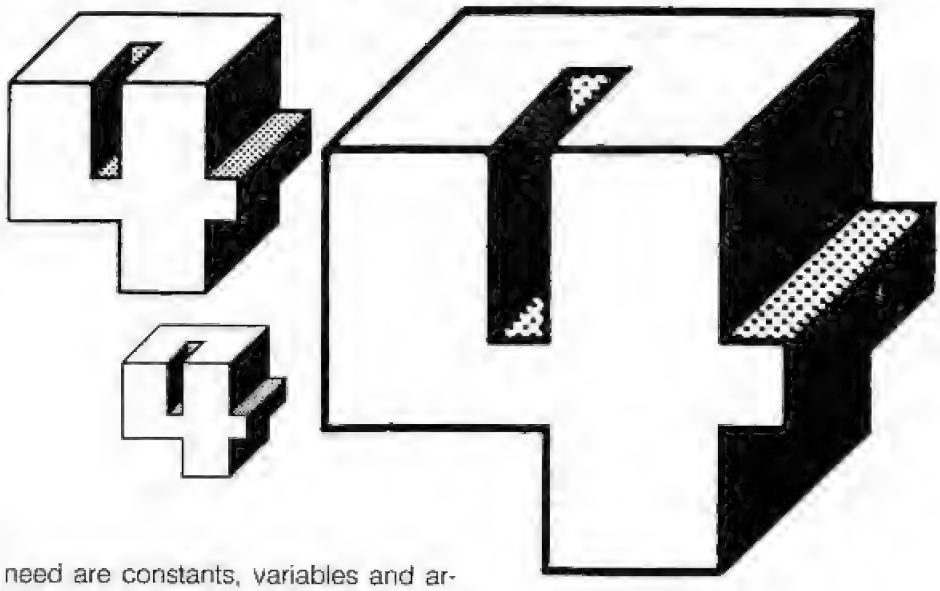
BASIC ALTERNATIVES

FORTH



Charles Gerrard provides some examples of practical Forth programming and highlights some similarities with other languages.

We have dealt with many of the Forth fundamentals in the last two months. Rather than try to supply a comprehensive guide to the language in only a few pages, we are attempting to provide an introductory overview of the language and hope to interest you in studying the language in full.

This month we will look at a few features of Forth which you would expect to find in more conventional languages. This will be followed by a complete worked example of the *Knight's Tour* problem. If you have been following our language tutorials, you may remember that we used the same example in the previous series on the language Lisp, so this should provide a useful comparison.

Until now, we have used the Forth stack only for storing values during calculation. It is possible to write any program using this method and Forth supplies a range of words for stack manipulation — figure one. These methods, however, can become unwieldy with large and complex data structure operations. What we really need are constants, variables and arrays. Coincidentally, Forth often provides them and if it does not, then they can be added easily.

Constants may easily be specified, using the word CONSTANT, in the form:

```
42 CONSTANT ANSWER
```

which would assign the value '42' to the word ANSWER in all future calculations. So it could then be used in other lines. For instance:

```
3 ANSWER * .
```

would give the answer:

```
126 ok
```

Variables, believe it or not, are defined using the word VARIABLE. This might be in the form:

```
VARIABLE QL
```

which sets aside the necessary storage, at a particular address in memory, for the variable QL. If you have access to a Forth implementation, you might like to try the following:

```
HERE .
VARIABLE QL
HERE .
QL .
```

During operation, Forth holds a dictionary of words which may be used. The word HERE will give the next available address in this dictionary. Having included the variable QL, the second call of HERE should show that the value has increased and the value of QL should return an address between the two changed values of HERE.

That is all very well but if QL returns a memory address, how do we find the value we want to assign to the variable? It is done using '!' for "fetch" and '@' for "write". So, having defined our variable QL, the following will give it the value of 42:

```
42 QL !
```

This can then be retrieved and printed using the sequence:

```
QL @ .
```

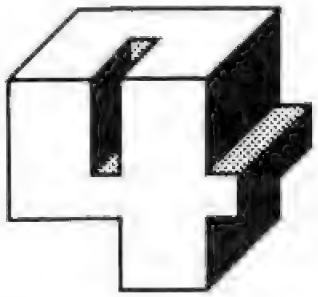
Having allowed the use of variables, you should not immediately be carried away and start using great quantities of them. The stack is a very flexible data structure for many applications, though in some cases the use of constants and variables improves readability. The simplest way of defining an

array is to add a subscript, using the words:

CREATE QL 50 ALLOT

which will allocate 50 bytes in the dictionary. That can then be accessed using offsets from QL. Remember that, depending on the size of number you are storing, you will get a maximum of 50 locations. Two-byte values will allow only 25 locations. The CREATE word creates a dictionary name, in this case QL. The next available dictionary location is the first byte of the parameter field.

It is unusual for a Forth package to include words for using arrays as stan-



dard. That is probably due to the number of variations which are likely to be used. Will they be bit, byte, word or double-precision arrays? Will they be vectors, two-dimensions, or more? It is much easier to leave the decision, and the definition, in the hands of the individual, who can decide exactly what is required. A fairly standard definition which will create and allow the use of arrays is:

```
: ARRAY CREATE 2 * ALLOT
        DOES> SWAP 2 * + ;
```

Here we are defining a new word — hence the colon — called ARRAY. It first removes the top number from the stack, then creates and allocates twice that number of bytes. The 'DOES>' part of the definition tells the computer how to act on subsequent occasions when that word is called — i.e., the word defined as an array. It could be called with something along the lines:

100 ARRAY QL

which would allocate 200 bytes to the name QL. If we then type something of the form:

42 1 QL !

we would have assigned the number '42' to the first element of the array. We can see this more clearly by examining the operation of the 'DOES>' part of the definition. It first SWAPs the top two stack values — see figure one. Then we have three values on the stack:

42—the value to be stored (bottom)
1—the array subscript
QL—the address of the first byte in the dictionary (top)

By swapping the two top values, the '1' will be brought to the top of the stack. That is multiplied by two, to give a word, rather than byte, offset, then added to the start address of the array dictionary area. That suggests that the array offsets should be in the range 0 to 199 — not 1 to 200. By changing the ARRAY definition, it is possible to have multi-dimensional arrays, and so on but it is rarely the case that they are necessary.

Putting all those ideas together, the following worked example of the Knight's Tour problem should demonstrate how a full program can be written — figure two. The problem is to have a chess knight perform a complete tour of the board, given a starting square, visiting every square on the board once. The program uses a simple back-tracking algorithm.

It operates by choosing a direction from the start square. If that is legal, then the current square is updated to the new location and the program tries another direction from here. At some point, the program will find that a direction from a square is illegal. At that point, it updates the DIRECTION (array name) of TRIED (array name) and tests again for legality. If at any time, it transpires that there are no legal moves from a particular square, then the program back-tracks to the previous square, trying a different direction from there, and so on.

Looking at the program, you will notice a minor change in the definition of ARRAY. It allows values in the range one upwards, rather than zero upwards, to be used. Following that are a few constant and array definitions. 'N' is the size of the board and I suggest you keep this low, unless you have plenty of time to spare! 'NN' is the square of this number and has been defined merely for convenience, as it is used more than once. The array definitions are for DIRECTION, which holds the eight possible knight moves. BOARD, holding a number indicating on which move the knight visits the appropriate square; TRIED, giving the last direction to be tried from a particu-

lar square; and POS, holding the co-ordinates of the squares visited, in order.

The SET-DIRS and SET-BOARD words will initialise those arrays. Next, a few variable definitions:

MOVE—holds current move number.
X,Y—hold coords. of current square.
A,B—hold coords. of next square.

The INIT word will initialise the problem, setting the move number and the original co-ordinates to (1,1).

The LEGAL definition will generate a new set of co-ordinates (A,B) from the previous co-ordinates (X,Y), based on

Figure 1. Stack manipulation commands

DROP: This will remove the top item from the stack, and discard it.
E.g., A B C D E F
to A B C D E

DUP: This will duplicate the top stack entry.
E.g., A B C D E F
to A B C D E F F

?DUP: As for DUP, but will only operate if the top stack item is non-zero.

OVER: This will copy the top of the stck but one to the top of the stack.
E.g., A B C D E F
to A B C D E F E

PICK: This will 'pick' a specified item (plus one) from the stack, and copy it to the top of the stack. The pick number is not included in the calculation. So, 0 PICK is the same as DUP.
E.g., A B C D E F, then 4 PICK
to A B C D E F B

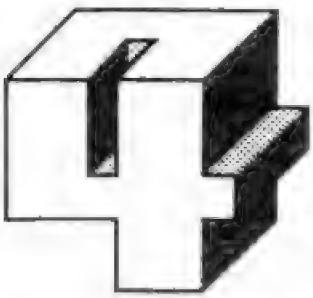
ROLL: This will roll a certain number of items at the top of the stack. The Nth item (plus one) is removed from the stack, the remaining items are moved down, and the picked item is placed at the top. This does not include the roll item, so 2 ROLL is equivalent to ROT.
E.g., A B C D E F, then 4 ROLL
to A C D E F B

ROT: This will rotate the top three items in the stack.
E.g., A B C D E F
to A B C E F D

SWAP: Simply swaps the two items at the top of the stack.
E.g., A B C D E F
to A B C D F E

the DIRECTION array. The direction (1 to 8) to be tested is found by testing the TRIED array at board position (X,Y).

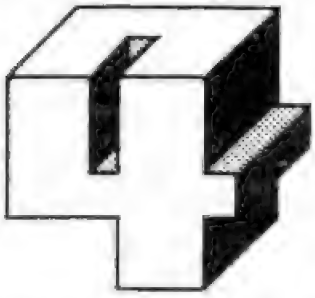
The main part of the program is the SOLVE definition. The first thing this checks is the value of MOVE. If MOVE reaches zero, it indicates that the program has found it necessary to backtrack past the initial starting square, which indicates no solution can be found with that starting square. If that happens, change the values of X and Y in the INIT definition and try again. Remember that the board is symmetri-



cal, so there is no point in trying (1,N), (N,1) or (N,N) if (1,1) does not work.

The next operation performed by SOLVE is to call EXPAND. This definition will update the value of TRIED at the current board position. You will notice that the board co-ordinates offset is duplicated and a copy saved on the stack on exit from EXPAND. That is for use by the BACKTRACK routine, if it is called. On exit from EXPAND, the top of the stack will contain a test flag. That will be true if all the possible directions have been checked from position (X,Y). In other words, the value of TRIED(X,Y) is nine.

If the foregoing is the case BACKTRACK will be called and the program will loop around, checking the previous square. Otherwise, the legality is checked. If the move is LEGAL, MAKE-MOVE will be called to update the board position, otherwise the pro-



gram will loop (the BEGIN..AGAIN loop) to try a different direction.

The structure of this program purposely has been made very similar to the SuperBasic solution — figure three, page 39, July, 1986, so you may find it useful to compare the two languages

Figure 2. Forth program

```
: ARRAY CREATE 2 * ALLOT
        DOES> SWAP 1- 2 * + ;
5 *    CONSTANT N
N N * CONSTANT NN
16      ARRAY DIRECTION
NN      ARRAY BOARD
NN      ARRAY TRIED
NN 2 * ARRAY POS
: SET-DIRS -2  1 -1  2  1  2  2  1
            2 -1  1 -2 -1 -2 -2 -1
           17 1 DO I DIRECTION ! LOOP ;
: SET-BOARD NN 1+ DO 0 I BOARD ! LOOP ;
VARIABLE MOVE
VARIABLE X  VARIABLE Y
VARIABLE A  VARIABLE B
: INIT 1 MOVE !  1 X !  1 Y !
       X @ 1- N * Y @ + DUP
       MOVE @ SWAP BOARD !
       0          SWAP tried !
       x @ MOVE @ 1- 2 * IP POS !
       Y @ MOVE @ 1- 2 * 2 + POS ! ;
: LEGAL X @ 1- N * Y @ + TRIED @ 1- 2 * I + DUP
        DIRECTION     @ X @ + A !
        I + DIRECTION @ Y @ + B !
        A @ 1  >  B @ 1  >  OR
        A @ N >  B @ N >  OR OR
      IF    0
      ELSE A @ 1- N * B @ + BOARD @ 0>
           IF 0 ELSE -1 ENDIF
      ENDIF ;
: EXPAND X @ 1- * Y @ P DUP DUP DUP
          TRIED @ 1+ SWAP TRIED !
          TRIED @ 9 = ;
          : BACKTRACK 0 SWAP BOARD !
                      MOVE @ 1- MOVE !
                      MOVE @ 1- 2 * DUP
                      POS @ X ! 1+ POS @ Y ! ;
: MAKE-MOVE MOVE @ + MOVE !
            MOVE @ 1- 2 * DUP
            A @ SWAP POS ! 1 + B @ SWAP POS !
            A @ 1- N * B @ + DUP
            MOVE @ SWAP BOARD !
            0          SWAP TRIED !
            A @ X !  B @ Y ! ;
: PR-SOL N 1+ 1 DO
         N 1+ 1 DO
                  I 1 - N * J + BOARD @
      LOOP OR LOOP ;
SOLVE BEGIN  MOVE @ 0 =
             IF     ." No solution with this start square. "
                    ABORT
             ELSE   EXPAND
                    IF      BACKTRACK
                    ELSE    LEGAL 0 < >
                            IF      MAKE-MOVE
                                    MOVE @ NN =
                                    IF PR-SOL ABORT ENDIF
                            ENDIF
                    ENDIF
             ENDIF
             AGAIN

: KTOUR SET-DIRS SET-BOARD INIT SOLVE ;
```

● *Next month we will be finishing our speedy tour of Forth and examining some of the language implementations available for the QL*

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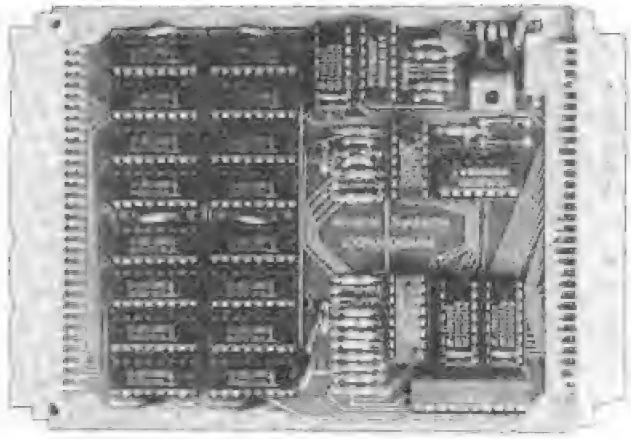

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COMPOSE YOURSELF

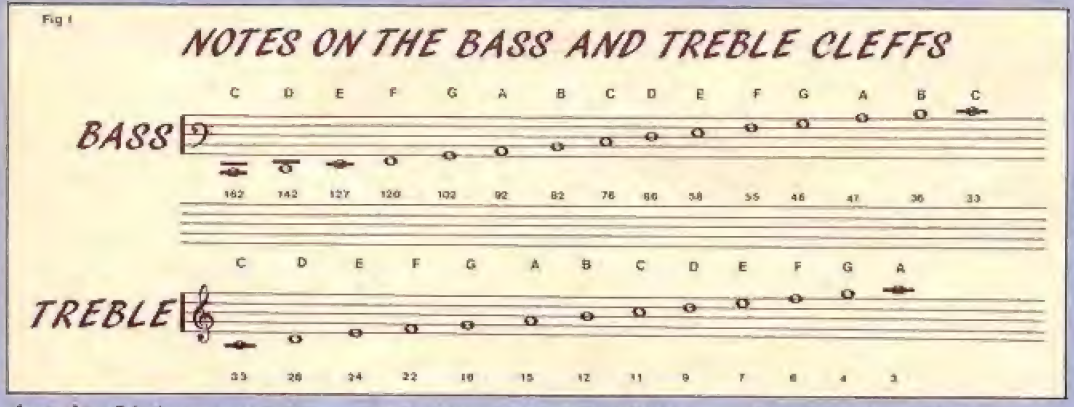
This month John Barnes reports on the unusual use that QL is being put to in South London.

Sound on the QL is a mystery. The quixotic reference to the BEEP command in the manual suggests that even the manufacturers have failed to come to grips with it. So, here, we set matters to right and explain not only how to write notes but also simulate voices so that, by the end of the article, you should have a fully-implemented Bach Prelude up and playing.

The QL is capable of producing notes over more than three and a half octaves where an octave is eight consecutive notes — Figure 1. The numbers below the notes correspond to the *Pitch 1* parameter of the BEEP command and the letters above are the note names.

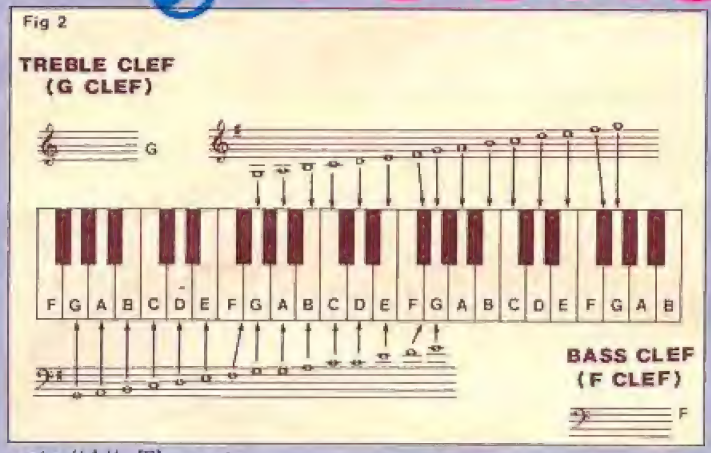
Our scale ends with top "A" (*pitch 1 = 3*). Beyond that the QL is extremely unreliable and, in any case, that is just about as high as most tunes go.

Fig 1



If we relate the scale to a piano keyboard — figure two — you will note that between most 'white' notes there appears a 'black' note. This is known as the "sharp" of the preceding (white) note or the "flat" of the subsequent (white) note. The difference between any note and the one immediately following — or preceding — is known as a semi-tone. For example, take note "A". The note immediately to its left is a black note and is called "A flat". The note immediately to its right is also black and is called "A sharp". It can also be called "B flat". Now look at the note "E", the note immediately to the left is black and called "E flat" or "D sharp" but the note immediately to the right is a white note called "F". It can also be called "E sharp".

Fig 2



If it sounds confusing, do not worry; simply remember that if you encounter a sharp or flat note in any music you are transcribing for the QL look to see which two "ordinary" notes it falls between and then halve the difference between the higher and the lower pitch number. We have inserted numbers for the most common sharps and flats in our table.

If we are to strike a rhythm on the QL we need to know not only the pitch of a note but also its relative duration. This is given in figure three as a list of the main types of notes, each preceded by a number designating the length of each note as a multiple or fraction of the basic note unit, the crotchet. Therefore, a minim, or half note, is worth two crotchets or quarter notes, while a quaver or eighth note is worth half a crotchet.

Fig 3

4	= whole note	(semibreve)
2	= half note	(minim)
1	= quarter note	(crotchet)
1/2	= eighth note	(quaver)
1/4	= sixteenth note	(semi quaver)
1/8	= thirtysecond note	(demi semi quaver)

Pieces of music always have a beat — what you tap your foot to when you are listening or move to when you are dancing. The two most common beats are four-time and three-time. The simplest way to find the beat of any piece is to look at the start of the score where the time signature, a kind of musical 'code' is kept.

So far as programming is concerned it makes a great sense to enter the code in groups corresponding to the basic beat — i.e., four beats at a time in four time — and then check that each line of duration values totals the same. For example, in this article we have used a very simple version of the sound command using *Pitch 1* only and setting all the remaining parameters except duration to 0. Duration is set to 65535, the longest possible, so that we can eliminate the current sound either by a subsequent sound or by a pause.

The QL is rather limited with only one sound channel, so it falls to the inventive programmer to try and make the beast sound like a polyphonic synthesiser. Even if that is not entirely possible we can achieve a passable imitation and one which will fool most people.

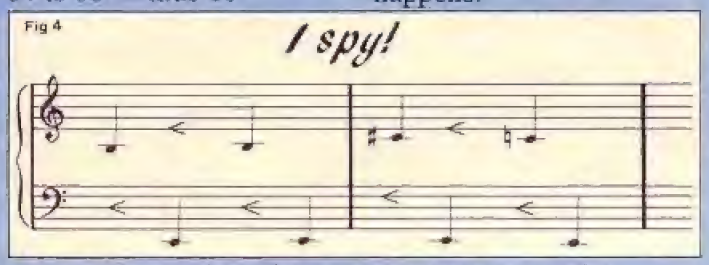
How is it done? The answer lies in the fact that composers of keyboard instruments in the eighteenth century used a technique called 'counterpoint' in which

they frequently used one voice but transferred the musical line rapidly between the very deep notes and the very high ones.

Thus an effect approximating two voices could easily be achieved.

The data statements at the end of the program listing demonstrate the effect with a rendition of Bach's Prelude No 21 in B flat major.

Bach's Prelude uses the 32nd note — demi-semi-quavers — as the basic melodic note, i.e., the most common duration. We have assigned the value 16 as the duration in the data statements — the second value in each pair of numbers in lines 54 to 95 — thus 16



corresponds to the value of a 32nd note. In figure four the basic note length is a quarter note, or a crotchet.

Rather than trying to determine the difference in values between a 32nd note at 16 and a quarter note — eight times longer — which would necessitate entering a value of 16×8=128 we keep the duration at 16 for the quarter note piece and alter line 18 "moveq #40,d2" to a greater value which can be anything up to 65535. "move.2 #320,d2" would give an acceptable rendition. The value in the data statements (16) can then be changed for any odd-length notes which are encountered, i.e., a half note would require 32 — double the length of a quarter note. The limit in duration is 127 as bit 7 of the byte is used to indicate if the note is staccato (shortened) or not. For example, a note played with length 16 would be the same duration as 144 (16+128) except that 144 would sound for slightly less time as bit 7 would be set. Try entering figure four and see if you can recognise it.

Silences in music are as important as notes and a pause is accomplished by entering a value "0" in the pitch byte — the first of the pair — and whatever note length is desired as the pause. Line 94 — second pair — shows this clearly.

This program is designed for inclusion in a larger program — it is the music driver for a commercial arcade release — and the listing has explanations but this, briefly, is what happens:

Any tune you write should be entered into the program directly as a series of data statements preceded by a label, e.g., "prelude". Each data line consists of four pairs of bytes with the first value in each pair being the pitch number — directly from figure one — and the second being the duration. The last byte in the music data must be -1 to end.

The calling procedure — lines 16-20 — must set a0 to point to the first byte of the data to be played. Therefore, as in line 17 the label of the particular piece must be inserted in place of "prelude". The data is read in byte by byte and does not require alignment to a word boundary. The pitch (1) is inserted into the "messsound" table which is required by Qdos to crank the second processor into making noises.

The quiet-note table, used for rests, de-cranks the second processor and is used for the staccato effect and the final cadence.

If you have Simplex expansion RAM use a much higher value in line 18 as the QL runs so much faster with its RAM that the tunes will be unrecognisable.

Finally, we have, by harsh experience, found that the last byte of the sound command is to be set to 1.

```
1   ;
2   ;       ************************************************
3   ;       *                                              *
4   ;       *                  << MUSIC >>                 *
5   ;       *                                              *
6   ;       *                     by                       *
7   ;       *                                              *
8   ;       *  STEVEN HOLLYWOOD      &       IAN B WILLIAMS *
9   ;       *                                              *
10  ;       ************************************************
11  ;
12  ;
13  mt_ipcom        equ     17
14  ;
15  ;
16  start
17          lea     prelude,a0      ; Load the tune data location into a0
18          moveq   #40,d2          ; Play it very fast
19          bsr.s   hi_fi           ; Branch to hi_fi
20          rts
21  ;
22  ;
23  ;
24  hi_fi
25  nexnot  lea     messsound,a3    ; Loads the pointer to messsound
26          move.b  (a0)+,d7        ; Reads the pitch parameter into d7
27          move.b  d7,6(a3)        ; Stores the pitch in the sound table
28          bne.s   not_qu          ; Is pitch 0?
29          bsr.s   shush           ; Yes: Kill last sound
30          bra.s   count           ; Pause for specified length
31  not_qu  cmp.b   #255,d7         ; Is pitch 255?
32          beq.s   shush           ; Yes: Return from hi_fi
33          moveq   #mt_ipcom,d0    ; Make sound
34          trap    #1              ;
35  count   moveq   #0,d1           ; Clear d1 (long)
36          move.b  1a0)+,d7        ; Load note length into d7
37          move.b  d7,d1           ; Transfer to d1 (d7 is needed later)
38          mulu    d2,d1           ; Multiply by 40 (steps up length)
39  mupause moveq   #20,d6          ; Fixed pause
40  npause  dbf     d6,npause       ;
41          dbf     d1,mupause      ; Counts down for pause length
42          tst.b   d7              ; Test length
43          bpl.s   nexnot          ; If length positive get next note
44          bsr.s   shush           ; If bit 7 is set then stop sound
45          bra.s   nexnot          ; Play next note (start again)
46  shush   lea     quiet_note,a3   ; These three lines
47          moveq   #mt_ipcom,d0        ; stop the note
48          trap    #1
49          rts
50  ;
51  ; Music data is inserted here and preceded by the label
52  ;
53  prelude
54          dc.b    38,16,22,16,9,16,22,16
55          dc.b    41,16,22,16,11,16,22,16
56          dc.b    38,16,22,16,9,16,22,16
57          dc.b    35,16,15,16,6,16,15,16
58          dc.b    46,16,28,16,14,16,28,16
59          dc.b    55,16,28,16,15,16,28,16
60          dc.b    46,16,28,16,14,16,28,16
61          dc.b    66,16,22,16,9,16,22,16
62  ;       !
63          dc.b    62,16,38,16,18,16,38,16
64          dc.b    66,16,38,16,22,16,38,16
65          dc.b    62,16,38,16,18,16,38,16
66          dc.b    87,16,28,16,14,16,28,16
67          dc.b    78,16,28,16,26,16,28,16
68          dc.b    87,16,28,16,18,16,28,16
69          dc.b    92,16,33,16,22,16,33,16
70          dc.b    120,16,41,16,26,16,41,16
71  ;       ;
72          dc.b    87,16,9,16,6,16,9,16
73          dc.b    55,16,14,16,9,16,14,16
74          dc.b    66,16,22,16,14,16,22,16
75          dc.b    87,16,28,16,22,16,28,16
76          dc.b    102,16,46,16,58,16,50,16
77          dc.b    46,16,41,16,38,16,33,16
78          dc.b    38,16,46,16,41,16,38,16
79          dc.b    33,16,28,16,24,16,22,16
80  ;       ;
81          dc.b    33,16,24,16,18,16,24,16
82          dc.b    46,16,33,16,24,16,33,16
83          dc.b    58,16,46,16,33,16,46,16
84          dc.b    76,16,58,16,46,16,76,16
85          dc.b    76,16,58,16,46,16,76,16
86          dc.b    102,16,11,16,7,16,11,16
87          dc.b    127,16,18,16,11,16,18,16
88          dc.b    162,32,24,16,18,16,24,16
89  ;       ;
90          dc.b    92,16,58,16,55,16,46,16
91          dc.b    41,16,36,16,33,16,28,16
92          dc.b    33,16,41,16,36,16,33,16
93          dc.b    28,16,24,16,22,16,28,16
94          dc.b    33,127,0,32,162,127
95          dc.b    -1              ; -1 isthe end of tune marker
96          align
97  messsound
98          dc.b    $0a,8           ; Command byte, no. of parameters
99          dc.l    $0000aaaa       ; Instructs trap to send information
100                                 ; to IPC in bytes (see text)
101         dc.b    0,0             ; Pitch 1, pitch 2 set to 0
102         dc.b    0,0,255,255     ; Grad_x (0,0), Duration (65535)
103         dc.b    0,0             ; No Grad_x, wrap, fuzziness or Rnd
104         dc.b    1               ; No return parameters - see text!!!!
105         align
106 quiet_note
107         dc.b    $0b,0           ; Command byte, no. of parameters
108         dc.l    $0              ; Send no data
109         dc.b    1               ; As above...
110 end
```

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TECHNICAL HELPLINE

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Plug Problem

A few years ago I owned an Atari 400 computer and an Atari joystick. Eventually I upgraded to a Sinclair QL but retained the joystick. The joystick is now without a plug on the end but has six colour-coded signal wires. I know which colours correspond to which joystick movement but I now need to know which pins are which on the control (CTLR) parts.

David March,
Tyldesley,
Greater Manchester.

A number of enquiries have reached us regarding the use of the two control ports on the back panel of the QL. More often than not they are used as joystick input ports.

That is not the only possible use for those ports. The QL has two general-purpose digital input controller ports, designated CTL1 and CTL2. The ports are linked to the normal QL keyboard and, therefore, require no SuperBasic channels to be opened. Neither do they require what is known as device driver software. That makes the ports extremely easy to use.

Each port permits a total of five inputs to be attached. The relationship between any of the 10 possible inputs and the QL keyboard is shown in figure one. If an input is connected, or at least has a very low resistance path — i.e., less than 600 ohms — to its respective common, the corresponding key will be assumed to have been pressed. Note that there is only one common pin for each of the two 6-pin ports. Inside the QL the two port commons are connected.

Clearly the easiest way of connecting one of the inputs to its common is to use a switch. Figure two (a) shows this set-up and it is exactly the situation with a commercially-available digital joystick.

There are other ways of connecting those lines to their common line as figure two (b) and (c) shows. A reed relay can be activated by a magnet moving past it. When the relay contacts come together, the input is connected to its common and the corresponding key can be read. A silicon analogue switch — e.g., 4016B, 4066B, DG303, HI201, AD7590 and many others — can be switched by some external logic circuit. The switch 'ON' resistance of those devices is at most a few hundred ohms — often much less — and therefore they will enable a switch position to be identified.

The type of plug required to fit the QL controller port socket is highly unusual for microcomputer equipment and is a British Telecom 6-way handset — not line — plug, reference 630W. If you cannot obtain one of those you can buy a 630A-type plug and file a little off the top of the pin 1 side of the plug. A special terminating tool will be required if you need to make up your own leads. Most good telephone shops should be able to sell you a suitable plug.

Because the controller inputs are linked directly to the keyboard, reading the ports is a matter of scanning the QL keyboard for the keys listed in figure one. In SuperBasic the best way of doing it is to use the KEYROW(row) function, where 'row = 1'

CTL1			BT plug	CTL2		
PIN	INKEY	KEYROW (1)		PIN	INKEY	KEYROW (0)
1	32	SPACE (64)		1	248	F5 (32)
2	208	↓ (4)		2	244	F4 (1)
3	216	↑ (128)		3	236	F2 (8)
4	200	→ (16)		4	240	F3 (16)
5	192	← (2)		5	232	F1 (2)
6	(COMMON)		Ref: 630A/W	6	(COMMON)	

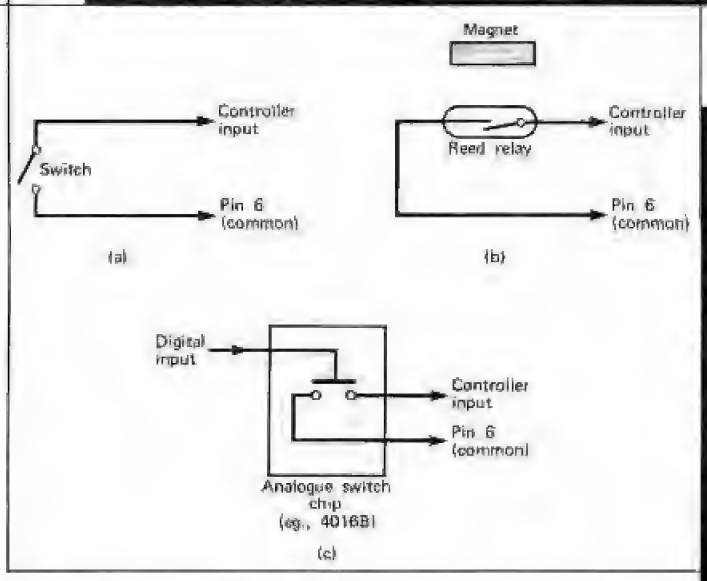
```
100 REMark Joystick control demonstration
110 REMark ------------------------------
120 CLS:OVER -1:INK 7
130 SCALE 200,-100,-100
140 ox=0:oy=0:x=0:y=0:draw_hairs
150 REPeat g
160   update_cross_hair
170 END REPeat g
180 STOP
190 :
200 DEFine PROCedure update_cross_hair
210 way=KEYROW(1):x=0:y=0
220 SELect ON way
230 = 2: x=-3:REMark go left
250 = 16: x=3:REMark go right
270 = 4: y=3:REMark go up
290 = 128: y=-3:REMark go down
310 = 64: BEEP 1500,50:REMark "hello!"
330 = REMAINDER: REMark ignore!!
350 END SELect
360 IF x+y=0: GO TO 400
370 draw_hairs:REMark wipe out old copy
380 ox=ox+x:oy=oy+y
390 draw_hairs:REMark show new position
400 END DEFine
410 :
420 DEFine PROCedure draw_hairs
430 LINE ox-5,oy TO ox+5,oy:LINE ox,oy+5TO ox,oy-5
440 END DEFine
```

Figure 1.3. Joystick demonstration program.

Missing Routine

The QL assembler utility BV_CHRIX $11A is not installed in my QL JM at $11A is: RTS. BV_CHRIX enables one to allocate space to the arithmetic stack; without it, most, if not all, of the utilities are so much window-dressing; they will work satisfactorily when the main memory is sparsely used but what if the program is large? Is there anyway of replacing this utility?

Anyone suffering from Microdrive insomnia should think about taking a 1 in. strip of Sellotape and wrap it round the tape casing, as if to make a read-only tape into a read/write. It will fit the QL more snugly and do everything much better. **John Thompson, Cardiff.**



for CTL1, and 'row = 0' for CLT2.

Figure one shows the function values returned for the two ports. The function INKEYS$(t) could also be used but is less useful as it embodies the initial key delay and key repeat rate set by the QL. That means the program response to your inputs will not be as immediate as you would like. When writing in machine code the same ideas apply. The KEYROW(row) function is obtained by using the MT.IPCOM call (TRAP #1, D0 = $11).

The SuperBasic function INKEY$(t) can be replaced by the Qdos call IO.FBYTE (TRAP #3. D0 = 1). Again, it would be better to scan the keyboard directly rather than use this latter call.

Figure three shows a simple program which will monitor a joystick plugged into CTL1. A small cross-hair is drawn on the screen, using XOR plotting, and moved around by appropriate use of the joystick.

Pressing the fire button will cause the internal QL speaker to bleep. The program demonstrates the use of XOR plotting for easy movement of figures round the screen and the use of the function KEYROW(row) to pick up operations in from the controller port.

Because the controller ports are connected directly to the keyboard, the program will work just as well without the joystick attached. Use the four cursor direction keys and the spacebar on the QL keyboard.

There are two main methods available to access routines in the Qdos ROM. One way is to use the TRAP code calls and the other is to use what are called vectored utility calls. The BV_CHRIX procedure belongs to the latter category.

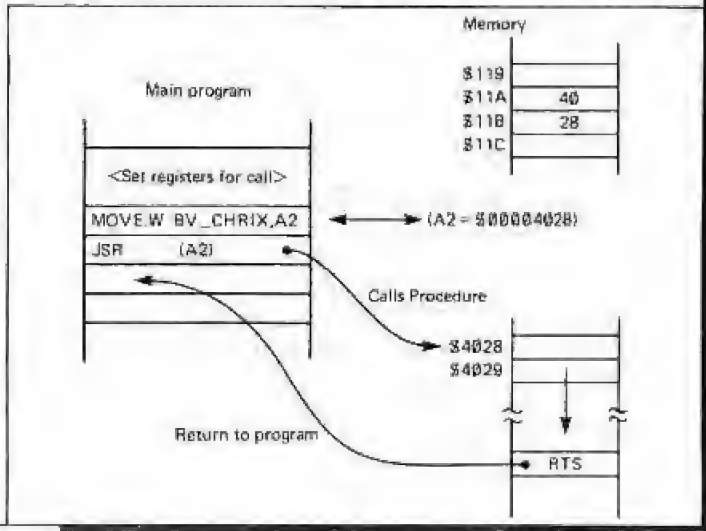
Figure four shows how a vectored procedure is called. First you would set up any appropriate registers, as dictated by the needs of the call about to be made. You would then load the 16-bit-word contents of the procedure vector address into an address register. Note that you are not loading the vector address into the address register.

The 16-bit-word just loaded is an address in the first 64 kilobytes of memory. That address is the absolute address of the start of the required procedure code. If you used address register A2 for the previous load operation, the required procedure can be called by executing a register-indirect subroutine-jump instruction as shown. At the end of the Qdos utility code there will be an RTS instruction which will return program execution to the instruction following your original call.

That is where Mr Thomson is becoming confused. He is correct to say that the absolute vector address for the utility BV_CHRIX is $11A. He is also correct about the operation of the call. We now know that his worry about seeing a supposed RTS instruction at the vector address is unfounded. How do we know? Because the two bytes at $11A and $11B are another address, not an instruction. So his JM QL supports BV_CHRIX. If you use the vector address correctly, as shown in figure four, you should achieve what you want.

If on the other hand you are in need of autonomous use of the arithmetic stack. You will probably need to reserve some extra space. The number of bytes you require should be in register D1 — as a 32-bit long word — on entry to the procedure. Registers D0 and D3 will be affected by the call. It is possible that the reserved area of memory for the arithmetic stack will change when the procedure is executed.

That is the method Qdos uses to try to ensure you get the size of reserved area you requested. If a procedure has anything on the arithmetic stack before BV_CHRIX is called, the arithmetic stack pointer — usually register A1 — should be saved in the SuperBasic variable pointer BV_RIP(A6) and then retrieved from BV_RIP(A6) afterwards.



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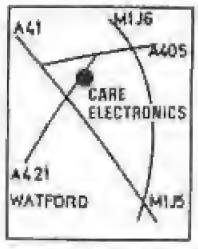

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PUZZLE PAGE

Marcus Jeffery recounts one of the oldest problems in the book.

This month's puzzle was inspired by an ancient ritual from the time of the Dawn of Man. In those early days, choosing an intelligent leader for the tribe was a headache. All the cavemen were good with calculations, usually of the form "How many woolly sweaters will we get from that mammoth?"

Unfortunately, although they could count very well, nobody had devised words for numbers beyond nine. Thus arrived the *Tribal Leader Game*.

The current leader of the tribe would choose a number of cavemen — always at least nine others — and they would all trek to a local plateau, carrying the biggest clubs on which they could lay their hands. They would stand in a circle facing inwards. Then, starting with the caveman to the left of the current leader and continuing clockwise round the circle, they would shout out 'ONE!', 'TWO!', and so on, in turn.

Of course, when it reached number 10, they had a problem. So, instead of shouting anything, the tenth person would clobber himself over the head, knocking himself senseless for the duration of the game.

The game would then continue, restarting at number one, shouted by the person to the left of the man who has just flattened himself, with all surviving members counting round up to 10, at which time yet another would knock himself out.

Short term solution

Only once in the history of man has any leader lasted more than one session in office. That one remarkable man always used to collect a large gathering of cavemen — and always the same number. What I would like to know is what is the least number of cavemen, including the leader, who could be chosen to give this desirable result?

In case you are still not sure how the game works, figure one shows a game with only four participants, in which the leader wins. Remember that the rules state that the leader must choose at least nine other people.

Figure 1.

Caveman No.	Actions
1 (leader)	4 8 2 5 8 1 3 5 7 9
2 (start)	1 5 9 3 6 9 2 4 6 8 X
3	2 6 X
4	3 7 1 4 7 X

KEY TO ACTIONS:
Number = Shout number
'X' = Knock senseless!

RULES

All entries must be written on the panel provided on this page. Any other form of entry will be disqualified.
Entries must be sent by post to:
PUZZLE PAGE,
Sinclair QL World,
79-80 Petty France,
London SW1H 9ED.
to arrive no later than October 15, 1986.

The winner will be the first correct entry drawn from the editor's Stegosaurus skull. If no-one submits the correct number of cavemen, the winner will be the person with the nearest answer.

All entries will be judged by the Editor of *Sinclair QL World*. The editor's decision is final and no correspondence will be entered into regarding the result.

ENTRY FORM
Number of Cavemen is:
_____
Name _____
Address _____
_____
_____
_____

I received many answers to the *Pub Crawl Puzzle*. Most people had the same idea as myself and the following procedure should enable anybody to find the correct solution. First, map out a few likely pubs in your area. The exact distance between them can be slightly different from the proposed time, as that may be adjusted later. Now, test all 40,320 routes; that is 322,560 pints.

Seriously, in the form of a program, it is not only the simplest way to solve the problem but also the only one which will ensure a correct result. The problem, as stated, is a variation on the age-old classic the *Travelling Salesman Problem*, in which you have to plan the shortest route between a number of cities. Though there are many methods which work quickly and guarantee near-optimal answers, nobody has yet devised a foolproof method of solving this type of problem any faster.

In case you are still working on this, the correct arrival time, to the nearest minute, is 9.48 pm, with the route:
Home—A—G—E—C—F—B—H—D—Home

The average programming time would seem to indicate that you could start the program running, go round the pub tour, and arrive home just after it has finished. One person who managed it is Jez Smith, from Wigan, Lancashire, who is the winner this month and will receive a year's free subscription.

Ron Massey draws some conclusions about the new Digital Precision graphics package.

Users of other brands of microcomputers will undoubtedly view the Digital Precision venture into computer-generated graphics, *EYE-Q*, with justifiable wistfulness. A powerful CAD system of monumental proportions, EYE-Q has managed to include every conceivable drawing option in a way which is simple to use.

Starting-up the program, once the various system windows have been set up, the STATUS window appears in its default position at the top of the screen, the window can be moved either to the bottom of the screen or switched-off entirely.

Containing useful information such as the cursor position, ink and paper colours and the drawing mode (SKIP/SET/XOR/ERASE), the STATUS window may contain other information such as cursor offset, wherein the current pixel position relative to some *other point on* the screen is indicated in direct pixel measurement. Other information appearing in the STATUS window, when required, are BOX dimensions, cursor dimensions and various system prompts.

You are now in the top level of the program which, if you are satisfied with the system defaults of a single-pixel cursor, black paper and white ink, you may begin drawing immediately by pressing (F1), to change the pen status from SKIP to SET.

One of the most impressive features of EYE-Q is its thoroughly fine-tuned operation. Changes of the cursor co-ordinate indicator occur with the smoothness of a fine watch; travel of the cursor is free of the usual ticking movement in the majority of graphics packages.

Air-brush — i.e. spray can — is toggled on/off using B+<CTRL]; a fine random ink pattern is sprayed underneath the cursor. You can change the cursor size to that which is most convenient. Two-colour spraying is easy, as is the use of stipples.

A concept made popular by the MacIntosh's *MacPaint*, rubber-banding, has become an enormously popular feature demanded by users of computer graphics programs. From the program's point of view, a screen line is drawn, erased and re-drawn every time the cursor position is altered. From the user's point of view, positioning of lines, with one end of a line anchored, occurs as if the line were, in fact, rubber, hence the name. Taking the implementation of rubber-banding to new heights, EYE-Q employs this method of drawing in all of the auto-geometry options.

Lines:

Cursor keys	Moves the line round a common anchor point.
L/R+<CTRL>	Bends the line into an ARC in either direction.
+<ALT>	Speeds line drawing.
<TAB>	Exchanges anchor points.

Circle/Ellipse:

Cursor keys	Move shape.
U/D+<CTRL>	Alters shape size.
L/R+<CTRL>	Alters shape eccentricity.
L/R+<SHIFT>	Rotate shape.
+<ALT>	Increase speed of execution.

Box:

Cursor keys	Alters the position of the box.
L/R+<CTRL>	Alters width from right side of box.
U/D+<CTRL>	Alters height from bottom of box.

Pixel dimensions appear in STATUS window, when present.

Filling a box, in the current ink, for block production can be accomplished by pressing <5>.

Changes of ink/paper/strip colour may be made either by pressing <F3> and going into the ink colour-wedge palette for the complete colour and stipple range available to either of the resolution modes or by pressing any one of the number keys for solid colours, if in magnify mode.

Magnification of the image, like the other EYE-Q features, is smooth and impressive. Occurring like a video cross-dissolve, there are two ranges of magnification which pan and scroll the

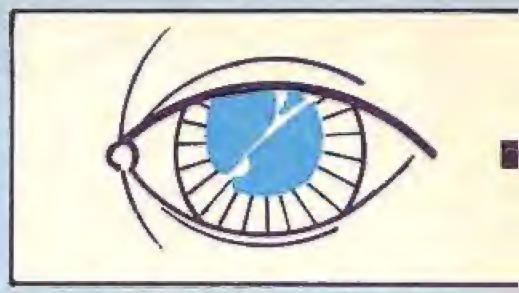


image as the cursor nears the limit of the screen.

Drawing while in magnification mode is limited to the range of solid colours for either ink, which can be changed temporarily by pressing the number key required, or the paper, by pressing <CTRL> and the appropriate number key. Single pixels for ink may be set by pressing <SPACE> or <ENTER> at the appropriate position; single pixel paper may be set by pressing <CTRL> and <SPACE> or <ENTER>.

Another outstanding feature of EYE-Q is its file-handling functions. Equipped with a complete range of the options of Directory, Format and File Deletes, its exceptional approach to file-handling are the Load and Save features.

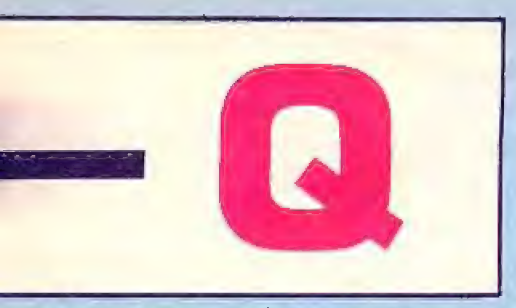
Taking the SAVE function first, a number of sub-options are available, providing for both the greatest economy of file space and versatility of subsequent picture applications. Pictures may be saved as 32K screen dumps or may be compressed for subsequent reloading — using EYE-Q or the SuperBasic ALOAD extension supplied.

Additionally, files may be saved in virtually any permutation of user-defined areas, as monochrome, four-colour or, where applicable, as full eight-colour files.

The LOAD function, a reverse procedure of that, will load either a full screen, if it was saved that way, or load a selectively-saved screen into the position from which it was saved where it can be re-located before it is set as a coherent image. Consistent with all of the EYE-Q commands, the picture load may be abandoned by pressing <ESC> the EYE-Q "whoops" control.

ALOAD is an EYE-Q function extension which may be used separately — another 'freeby,' FONTLOAD, is supplied as well — in your programs. A valid window at least the size of the saved screen must be available for subsequent loading of pictures or an error message, "out of range", will be reported and the proceedings will halt abruptly.

Exceptional to EYE-Q, a complete menu is devoted to a range of screen manipulations, wherein whole or selec-



ted parts of a screen may be altered as required. If, once a change to the previous screen is completed, you decide that its execution did not live up to the expectation, invoking the "whoops" option — pressing <ESC> — will restore the drawing to its original glory.

Horizontal or vertical stretch Increases the image individually from a selected area by a factor of two. If the entire screen is stretched in either direction, expansion occurs from the upper left corner of the screen.

Reflection occurs, either as a whole screen or as selected portions of a screen, about the vertical axis of the picture, reversing it from left to right.

Inversion reverses the image from top to bottom and left to right. Again, this may be done either selectively or over the entire screen.

Transfer duplicates a selected area to another part of the screen.

Pan/scroll may occur selectively or over the entire screen. Selective windows are used in the same manner as for producing BOXes. Images in the windows so produced can be moved and will, at the edges of the window, wraparound optionally to the opposite side.

Recolour Either an entire or selected portion of a screen may be recoloured. The selection menu is presented after the area has been chosen and the basic solid colours are presented on the menu in pairs. Each colour change alters the right-hand colour name through each of the colours available. Pressing <ENTER> sets a colour change and allows you to move to the next colour. When all of the colours have been set, pressing <ESC> will re-colour the selected portion of the screen, which may be accepted or "whoopsed".

Reduce The chosen screen area is compressed horizontally and vertically to seven-eighths of the original size, also affecting any text present on the screen, with some loss of detail.

Consistent with the attention paid to other areas of EYE-Q, complete facilities are included for using the full range of sizes available in high- and low-res modes. There are three text representation modes — strip, transparent background and XOR.

As a bonus, a complete character font editor is included for temporary or permanent (saved) editing; standard fonts created elsewhere can be accessed. A big range of options is included — manipulation (inversion and reflection)/editing/restoring/copying/wiping/selecting/installing and, within the file menu, saving the new character set.

A printer-dump is available at any time 'Accuracy is superb,' the user is allowed to change or fine-tune it. On-screen help is available — 17 screens full. "Whoops" allows any changes to be undone. Multiple copies of EYE-Q can be run simultaneously, each having its own screen, memory permitting.

It is difficult, if not impossible, to point to any EYE-Q feature which makes it so outstanding. It is a brilliant concept, very well-produced. Incorporating the best features contained in many of the better graphics programs, along with some very original, useful and highly-innovative functions into a smoothly-integrated working program.

EYE-Q

Source: Digital Precision — **Price:** £24.95

Drawing method	Continuous; pixel graphics.
Definition modes	4 and 8; internally-switchable without loss of picture.
Colour range	Full range in both modes.
Method of selection	Cursor on colour-wedge palette.
Command access	Keyboard, ABC mouse or joystick.
Menu	Yes; Main and sub-menus.
Icons	No.
Method of entry	<F3> for main menu; <ESC> to top level.
Help pages on screen	Yes (17); related to drawing mode.
Aids: Border reference	No.
Grid (on select)	No.
Cursor co-ord indicator	Yes; also direct measure of lengths; user-definable origin: dx, dy, ds.
Prompt window	Optional screen top, bottom or off.
Image pan/scroll	Yes, both.
Element move/reposition	Yes.
Image magnification	Yes; dual range; draw while in either.
Auto mirror image	Yes.
Pen direction indicator	No.
Stretch/compress	Yes; horizontal and vertical.
Drawing tools:	
Pen	Yes; area of cursor.
Width control	Yes; continuous 1 pixel to half screen.
Brush — sizes	Pen only.
Airbrush	Yes; Over and XOR modes.
Auto fill — on select	Yes; borders for fill are user-definable.
Erase	Yes; with variable size cursor.
Drawing modes	
Pen off	Yes; "Skip."
Pen on	Yes; "Set."
XOR	Yes; "XOR."
Cursor on screen	Yes.
Control	Cursor keys; 8-way.
Movement	Continuous; accelerating or 2-speed.
Turtle graphics	No.
Type	Squarish; size and aspect ratio user-definable.
Auto colour change (re-colour)	Yes.
Auto-geometrics	Multiple-speed drawing.
Rubber banding	Yes; individual movement of line ends.
Circle	Yes.
Ellipse	Yes.
Arc	Yes.
Box	Yes.
Triangle	No.
Others	Block
Line: length	Yes.
width	No.
Element movement	No.
Element duplication	Yes.
Auto shadowing	No.
Text	Yes, Std or custom fonts; integral UDCG.
Modes	Strip, XOR, Over 1, Off.
Colour	Full range.
Sizes	0,0 TO 3,1
Positioning	By character and/or pixel movement.
File control	
Directory	Yes.
Load a screen	Yes; whole or re-positionable part.
Save a screen	Yes; 32K, compress, mono, 4- or full-colour — any combination.
Delete a file	Yes.
Format media	Yes — including RAMdisk.
Load/save/edit fonts	Yes.
Printer dump	Yes; re-configurable to suit individual printers.
Area printed	Whole screen.
Demo pics supplied	Yes.
Average no. files/cart	10.
Principal application	Complete system for production of two-dimensional technical and general illustrations. Full multi-tasking capabilities.

THE P+R:O=G<S

If you have a program that is worthy of consideration, send it to 'The Progs', Sinclair QL World, Wells House, 80–82 Upper Street, London N1. We pay for everything published at the usual page rates — £80 per thousand words.

Attack of the Things
Stuart Campbell

Whackily titled Attack of the Things is Program of the Month, so you need be in no doubt as to its quality.

The idea is to zap the advancing Things as they encroach upon your ship from the far right of the screen. As well as the kind of speed that only machine code affords, the game features excellent graphics.

First type in the hex loader program in the second listing, make sure you have a Microdrive in MDV1 and run the program. Then type in the first, short listing and save it on the same Microdrive as a BOOT file. To run the game just put the cartridge in MDV1 and press F1 or F2.

```
100 MODE 8
110 a=RESPR(5*1024)
120 LBYTES MDV1_ATTACK,a
130 CALL a
```

```
1 DATA "4DFA08FA4BEE02007000",1015
2 DATA "4E4143E8002E2D490004",610
3 DATA "43E800962D4900087001",688
4 DATA "72FF760241FA027A4E42",1072
5 DATA "2C8842AE0034610000A2",731
6 DATA "6100027C2D7C00000003",395
7 DATA "001043FA023A237C3030",648
8 DATA "30300008337C3030000C",387
9 DATA "42AE00146100056610O",545
10 DATA "0848610006561O009D4",587
11 DATA "61000AB44AAE001066E6",883
12 DATA "205643FA020845FA0212",784
13 DATA "202E0014B0AE00346D10",625
14 DATA "2D40003425690008O008",319
15 DATA "3569000C000C70277200",447
16 DATA "76FF4E4370284E437029",968
17 DATA "72054E4370204E437010",681
18 DATA "720F74074E4343FA01C8",915
19 DATA "367800D04E937010720F",864
20 DATA "740876FF4E43224A4E93",975
21 DATA "7001767F4E436000FF5E",948
22 DATA "700176282O6E00004E43",558
23 DATA "4A4067F24E7543FA0196",1146
24 DATA "20564A4067145340720A",650
25 DATA "523110020C3100391002",285
26 DATA "621A51C8FFF27017722A",1193
27 DATA "343C00F276FF4E4343FA",1189
28 DATA "016C347800D04ED213BC",984
29 DATA "003010025341660060DE",842
30 DATA "48E7C000C2FC0080E448",1369
31 DATA "D240D240028100007FFE",1060
32 DATA "0081000200002041CDF",527
33 DATA "00034E75E98F4CF5000F",910
34 DATA "70004A43671A6100002E",525
35 DATA "4A4367126100FFC86100",911
36 DATA "00BA48F5000F7000E88F",1005
37 DATA "4E75266E000438130244",492
38 DATA "808067EA4CF4000F7000",1040
39 DATA "6000FFE23802E54C5242",1088
40 DATA "0242001FD0724000D272",809
41 DATA "40024A40671A0C4000FF",664
42 DATA "62144A4167103A290002",477
43 DATA "4445DA7C00E9B2456202",1059
44 DATA "4E759072400092724002",843
45 DATA "76006100FF6638113A29",744
46 DATA "00026100000044E754E40",440
47 DATA "48E7F000534453457603",967
48 DATA "C697E30B303CAAAA323C",1145
49 DATA "555534042F0810C010C1",698
50 DATA "51CAFFFA4A43670410C0",1244
51 DATA "10C1205FD1FC00000080",925
52 DATA "51CDFFE24CDF000F46FC",1403
53 DATA "00004E75204D707F4298",761
54 DATA "51C8FFFC4E754E4048E7",1428
55 DATA "F0003019321953405341",683
56 DATA "7603C697E30B7C089C03",999
57 DATA "34002F08383CAAAA3A3C",681
58 DATA "55551819E67C10C41A19",836
59 DATA "E67D10C5183C00AA1A3C",908
60 DATA "0055EC7CEC7D51CAFFE6",1574
61 DATA "4A436708E67C10C4E67D",1173
62 DATA "10C5205FD1FC00000080",929
63 DATA "51C9FFC24CDF000F46FC",1367
64 DATA "00004E75000C53636F72",614
65 DATA "652030303030303000OC",433
66 DATA "486920202020303030",497
67 DATA "303009010000000102",109
68 DATA "000F434F4E5F35313278",606
69 DATA "323536613078300O7027",621
70 DATA "72007BFF206E00004E43",774
71 DATA "70284E4370204E437E00",712
72 DATA "7029220776FF4E43702D",869
73 DATA "720374014E4370107206",627
74 DATA "74024E437007741443FA",835
75 DATA "00484E43702D72037400",607
76 DATA "4E437010720974124E43",675
77 DATA "7007740D43FA00424E43",776
78 DATA "52877001760l4E434A40",732
79 DATA "6600FFB87027720576FF",1184
80 DATA "4E4370284E4370297201",710
81 DATA "4E43702D720274004E43",679
82 DATA "4E7541545441434B204F",746
83 DATA "46205448452054484946",666
84 DATA "475350524553532041 4E",726
85 DATA "59204B4559000000707F",593
86 DATA "323C00E76100FDCA7805",1018
87 DATA "7A166100FE6A383C00A4",881
88 DATA "3A3C00E76100FDB67805",1006
89 DATA "7A166100FE56383C00C8",897
90 DATA "3A3C00E76100FDA27805",986
91 DATA "7A166100FE424AAE0010",825
92 DATA "674E707F323C00E76100",858
93 DATA "FD8A43EE04C06100FE78",1363
94 DATA "0CAE00000001001067 32",356
95 DATA "303C00A4323C00E76100",710
96 DATA "FD6C43EE04C06100FE5A",1303
97 DATA "0CAE00000002001067 14",327
98 DATA "303C00C8323C00E76100",746
99 DATA "FD4E43EE04C06100FE3C",1243
100 DATA "4E754AAE0020671C7037",773
101 DATA "222E000CD2BC00000008",501
102 DATA "6100FD2E7030323CAA55",921
103 DATA "30C151C8FFFC4E752D7C",1393
104 DATA "000000CE000C600442AE",558
105 DATA "000C7020222E000C4A41",387
106 DATA "6BF20C4100CF6AE26100",1062
107 DATA "FCFE43EE04C02D480030",1172
108 DATA "6000FDE86100FFAC6100",1202
109 DATA "00C047FAFE5A70114E41",1129
```

```
110 DATA "0801000866342AE0020",441
111 DATA "080100026704S3AE000C",387
112 DATA "08010007670452AE000C",391
113 DATA "0801000366080241008A",321
114 DATA "66A64E75508F6000FBBC",1221
115 DATA "E88A51CA001660524AAE",1101
116 DATA "002066C6202E000CD0BC",818
117 DATA "0000000B741FE98A2235",616
118 DATA "2004808160DCD2AE001C",1082
119 DATA "B0816ED44CF500032000",983
120 DATA "42B5200042B5200442B5",809
121 DATA "200842B5200C6100FC6A",786
122 DATA "4CEED03000186100FD08",744
123 DATA "52AE001470016100FC16",760
124 DATA "7037222E000CD2BC0000",857
125 DATA "00086100FC467030323C",700
126 DATA "AAFF30C151C8FFFC46AE",1698
127 DATA "0020701147FA006A4E41",731
128 DATA "4E75206E003043EE04C4",890
129 DATA "D1FC00000080D3FC0000",1052
130 DATA "000A7004B3486830D1FC",988
131 DATA "00000100D3FC00000014",484
132 DATA "51C8FFEED1FC0000007E",1361
133 DATA "50897004B3486612D1FC",1165
134 DATA "000000FCD3FC00000010",731
135 DATA "51C8FFEE4E75DFFC0008",1444
136 DATA "000C4AAE00106700FB20",662
137 DATA "598F53AE00102F2E002C",642
138 DATA "4E7S0A0A00000AAA0040",459
139 DATA "0001000F040F00000100",36
140 DATA "00006100FB60701147FA",894
141 DATA "01284E41702076FF2056",819
142 DATA "4E436100FC862D7C0000",797
143 DATA "0078000C42AE00206100",501
144 DATA "FDBA6100FE7870006100",1119
145 DATA "FB422D7C00000600024",528
146 DATA "4E756100FFC245FAFFFA",1565
147 DATA "2D4A002C2D7C00000003",335
148 DATA "00182D7C0000000A001C",231
149 DATA "6100FE6845FA025449FA",1183
150 DATA "003E7E0043EE04006100",594
151 DATA "FB6852470C4700036DF0",943
152 DATA "43EE04406100FB585247",962
153 DATA "0CA700066DF043EE0480",875
154 DATA "6100FB4852470C470009",665
155 DATA "6DF053AE00246600FFBC",1187
156 DATA "4E75000000DC0000006E",525
157 DATA "00000000000000010000",1
158 DATA "00F0000005A00000000",330
159 DATA "0000000100000F00000",241
160 DATA "0082000000000000001",131
161 DATA "000000C80000001E0000",230
162 DATA "00000000001000000DC",221
163 DATA "0000000A000000000000",10
164 DATA "0001000000DC00000032",271
165 DATA "00000000000000010000",1
166 DATA "00C8000000BE00000000",390
167 DATA "0000000100000DC0000",221
168 DATA "00AA000000000000001",171
169 DATA "000000DC000000D20000",430
170 DATA "0000000000010A0A0000",21
171 DATA "0AAA0140000A00280200",297
172 DATA "00000100000006100FEBA",538
173 DATA "45FAFFFA2D4A002C2D7C",1156
174 DATA "0000000400182D7C0000",197
175 DATA "0007001C6100FD6045FA",800
176 DATA "014C49FA00467E0043EE",903
177 DATA "06142D4900287003C0AE",665
178 DATA "0024671C0C0000026716",306
179 DATA "06AE0000003C00280C00",292
180 DATA "0001670806AE0000003C",352
181 DATA "0028226E00286100FA34",623
182 DATA "52470C4700106DF053AE",858
183 DATA "002466B04E75000000E6",739
184 DATA "0000001400000000000",20
185 DATA "0001000000E800000020",265
186 DATA "00000000000000010000",1
187 DATA "00EA0000002C00000000",278
188 DATA "0000000100000E60000",231
189 DATA "0038000000000000001",57
190 DATA "000000E8000000440000",300
191 DATA "00000000000100000EA",235
192 DATA "0000005000000000000",80
193 DATA "0001000000E600000005C",323
194 DATA "00000000000000010000",1
195 DATA "00E8000000068000000",336
196 DATA "0000000100000EA0000",235
197 DATA "00740000000000000001",117
198 DATA "000000E600000080000",358
199 DATA "00000000001D00000E8",233
200 DATA "0000008C000000000000",140
201 DATA "0001000000EA00000098",387
202 DATA "00000000000000010000",1
203 DATA "00E6000000A400000000",394
204 DATA "0000000100000EB0000",233
205 DATA "00B000000000000000001",177
206 DATA "000000EA000000BC0000",422
207 DATA "0000000000001000000E6",231
208 DATA "000000CB000000000000",200
209 DATA "0001FFFEFFFFFFFEFFFF",2039
210 DATA "FFFEFFFFFFFEFFFFFFFE",2547
211 DATA "FFFFFFFEFFFFFFFEFFFF",2548
212 DATA "FFFEFFFFFFFE0001FFFE",2038
213 DATA "0001FFFE0001FFFE0001",1021
214 DATA "FFFE0001FFFE0001FFFE",1529
215 DATA "0001FFFE0001FFFE0001",1021
216 DATA "FFFE0001FFFE0001FFFE",1529
217 DATA "0001FFFE0001FFFE0001",1021
218 DATA "FFFE0001FFFE0001FFFE",1529
219 DATA "FFFFFFFEFFFFFFFEFFFF",2548
220 DATA "FFFEFFFFFFFEFFFFFFFE",2547
221 DATA "FFFFFFFEFFFFFFFEFFFF",2548
222 DATA "6100FCCC45FAFFFA2D4A",1496
223 DATA "002C2D7C000000030018",240
224 DATA "2D7C00000009001C6100",303
225 DATA "FB7245FA00F249FA002E",1295
226 DATA "7E0043EE05A0B100FB72",1055
227 DATA "52470C4700076DF043EE",897
228 DATA "05DA6100F86252470C47",902
229 DATA "000C6DF053AE00246600",756
230 DATA "FFCC4E75000000DC0000",874
231 DATA "00050000000000000001",6
232 DATA "000000F0000000230000",275
233 DATA "00000000000010000000DC",221
234 DATA "00000041000000000000",65
235 DATA "0001000000F00000005F",336
236 DATA "00000000000000010000",1
237 DATA "00DC0000007D00000000",345
238 DATA "0000000100000F00000",241
239 DATA "009B000000000000001",156
240 DATA "000000DC000000B90000",405
241 DATA "0000000000010000000E6",231
242 DATA "00000032000000000000",50
243 DATA "0001000000D200000050",291
244 DATA "00000000000000010000",1
245 DATA "00E60000006E00000000",340
246 DATA "0000000100000D20000",211
247 DATA "008C000000000000001",141
248 DATA "000000E6000000AA0000",400
249 DATA "0000000000001FFFE0000",510
250 DATA "FFFE0000FFFE0000FFFE",1527
251 DATA "0000FFFE0000FFFE0000",1018
252 DATA "FFFE0000FFFE0000FFFE",1527
253 DATA "0000FFFE0000FFFE0000",1018
254 DATA "FFFE0000FFFE0000FFFE",1527
255 DATA "0000FFFE0000FFFE0000",1018
256 DATA "FFFE0000FFFE0000FFFE",1527
257 DATA "0000FFFE0000FFFE0000",1018
258 DATA "FFFE0000FFFE0000FFFE",1527
259 DATA "0000FFFF0001FFFF0001",1022
260 DATA "FFFF0001FFFF0001FFFF",1532
261 DATA "0001FFFF0001FFFF0001",1023
262 DATA "FFFF00016100FB3845FA",1234
263 DATA "FFFA2D4A002C2D7C0000",837
264 DATA "00030018207C00000009",205
265 DATA "001C2D7C000008000024",241
266 DATA "6100F9D645FA003A49FA",1260
267 DATA "FCBE7E0043EE05A02D49",1156
268 DATA "00287001C0AE00246708",666
269 DATA "43EE05DA2D490028226E",830
270 DATA "00286100F6BE52470C47",809
271 DATA "00106DF053AE00246600",760
272 DATA "FFC44E75FFFE0000FFFE",1664
273 DATA "0000FFFE0000FFFE0000",1018
274 DATA "FFFE0000FFFE0000FFFE",1527
275 DATA "0000FFFE0000FFFE0000",1018
276 DATA "FFFE0000FFFE0000FFFE",1527
277 DATA "00000000000100000001",2
```

```
278 DATA "00000001000000010000",2
279 DATA "00010000000100000001",3
280 DATA "00000001FFFE0000FFFE",1019
281 DATA "0000FFFE0000FFFE0000",1018
282 DATA "FFFE0000FFFE0000FFFE",1527
283 DATA "0000FFFE0000FFFE0000",1018
284 DATA "FFFE0000FFFE0000FFFE",1527
285 DATA "00008100FA5443FAFFFA",1253
286 DATA "2D49002C2D7C00000003",334
287 DATA "00182D7C00000009001C",230
288 DATA "2D7C0000100000246100",318
289 DATA "F8F245FA003849FAFBDA",1657
290 DATA "7E0043EE06C82D490028",795
291 DATA "7001C0AE0024670806AE",806
292 DATA "0000003A0028226E0028",282
293 DATA "6100F5DA52470C470010",812
294 DATA "6DF053AE002466C44E75",1135
295 DATA "FFFF0000FFFF0000FFFF",1530
296 DATA "0000FFFF0000FFFF0000",1020
297 DATA "FFFF0000FFFF0000FFFF",1530
298 DATA "0000FFFF0000FFFF0000",1020
299 DATA "FFFF0000FFFF0000FFFF",1530
300 DATA "0000FFFF0000FFFF0000",1020
301 DATA "FFFF0000FFFF0000FFFF",1530
302 DATA "0000FFFF0000FFFF0000",1020
303 DATA "FFFF0000FFFF0000FFFF",1530
304 DATA "0000FFFF0000FFFF0000",1020
305 DATA "FFFF0000FFFF0000FFFF",1530
306 DATA "0000FFFF0000FFFF0000",1020
307 DATA "FFFF0000FFFF00000000",1020
308 DATA "5634000300AAA55AA55",677
309 DATA "AA55AA550000AA55A854",1017
310 DATA "00AA2A15A05200AA0A85",788
311 DATA "A05200AA0A85A05200AA",967
312 DATA "0A85A05200AA0A85A854",950
313 DATA "00AA2A15AA550000AA55",743
314 DATA "AA55AA55AA550003000A",778
315 DATA "AA55AA55AA55AA550000",1020
316 DATA "AA55A854AA002A15A250",982
317 DATA "AA008A05A250AA008A05",866
318 DATA "A250AA008A05A250AA00",967
319 DATA "8A05A854AA002A15AA55",883
320 DATA "0000AA55AA55AA55AA55",1020
321 DATA "0003000AAA55AA55AA55",778
322 DATA "AA550000AA55A854AAAA",1102
323 DATA "2A15A252AAAA8A85A252",1162
324 DATA "AAAA8A85A252AAAA8A85",1466
325 DATA "A252AAAA8A85A854AAAA",1447
326 DATA "2A15AA550000AA55AA55",628
327 DATA "AA55AA55000500016AA55",792
328 DATA "AA55AA55AA55AA558241",1215
329 DATA "AA55AA55AA55AA558048",1220
330 DATA "2A15AA55AA55AA558A4A",1040
331 DATA "0201AA55AA55AA55804A",970
332 DATA "283C2A15AA55AA558A4A",685
333 DATA "2A3F82C1AA55AA55804A",1140
334 DATA "2A3FA8FC2A15AA558A4A",1055
335 DATA "000002028281AA55804A",720
336 DATA "00AA00AA00A82A158A4A",783
337 DATA "AAAAAAAAA0A282818040",1453
338 DATA "00000000080A88A88A4A",534
339 DATA "AAAAAAAA888A88A8804A",1460
340 DATA "00AA00AA00A282818A4A",873
341 DATA "AAAAAAAAA8A82A15804A",1281
342 DATA "00AA00AA0281AA558A4A",938
343 DATA "AAAAA8A82A15AA55804A",1196
344 DATA "00AA0281AA55AA558A4A",1023
345 DATA "A8A82A15AA55AA55804A",1111
346 DATA "0281AA55AA55AA558848",1104
347 DATA "2A15AA55AA55AA558241",1023
348 DATA "AA55AA55AA55AA55AA55",1275
349 DATA "AA55AA55AA55AA550003",1023
350 DATA "0009AA55AA55AA55AA55",1029
351 DATA "2A15AA55A8540AC5AA55",1032
352 DATA "A0S300002A15804F00FF",768
353 DATA "0AC5A05300002A15A854",765
354 DATA "0AC5AA55AA552A15AA55",1035
355 DATA "AA55AA55AA5500030009",777
356 DATA "AA55AA55AA55AA552A15",1083
357 DATA "AA55A8548AC5AA55A253",1342
358 DATA "00002A158A4FAAFF8AC5",1040
359 DATA "A25300002A15A8548AC5",895
360 DATA "AA55AA552A15AA55AA55",1083
361 DATA "AA55AA5500040007AA55",776
362 DATA "AA55AA55AA5500000000",765
363 DATA "00000A05002A0A8A8A80",471
364 DATA "8A05002A2A2A2A008A05",454
365 DATA "0028A8A8AA008A050000",689
366 DATA "000000000A05AA55AA55",525
367 DATA "AA55AA5500040007AA55",776
368 DATA "AA55AA55AA5500000000",765
369 DATA "00000A052A2A8A80800A",503
370 DATA "0A852A2A2A00002A0A85",454
371 DATA "2828A80000AA0A850000",561
372 DATA "000000000A05AA55AA55",525
373 DATA "AA55AA5500040007AA55",776
374 DATA "AA55AA55AA5500000000",765
375 DATA "00000A052A00800A0A8A",343
376 DATA "8A852A00002A2A2A8A85",710
377 DATA "280000A8AAAA8A850000",819
378 DATA "000000000A05AA55AA55",525
379 DATA "AA55AA5500030009AA55",777
380 DATA "8A45AA55A8542030AA55",1049
381 DATA "A25322332A15A050A8FC",1053
382 DATA "2A158A4FAAFF8AC5A050",1280
383 DATA "A8FC2A15A25322332A15",876
384 DATA "A8542030AA55AA558A45",1049
385 DATA "AA5500030009AA558A45",729
386 DATA "AA55A8542020AA55A252",1070
387 DATA "22222A15A050A8A82A15",770
388 DATA "8A4AAAAA6A85A050A8A8",1399
389 DATA "2A15A25222222A15A854",690
390 DATA "2020AA55AA558A45AA55",1036
391 DATA "00",0
1000 ADDR=RESPR(5*1024)
1010 OFFSET=0
1020 HEX$="0123456789ABCDEF"
1030 RESTORE
1040 FOR L=1 TO 391
1045  AT 0,0:PRINT "LINE"!L
1050  IF OFFSET=3070 THEN OFFSET=4090
1060  SUM=0
1070  READ A$,CHECK
1080  FOR F=1 TO LEN(A$) STEP 2
1090   BYTE=((A$(F) INSTR HEX$)-1)*16
1100   BYTE=BYTE+(A$(F+1) INSTR HEX$)-1
1110   POKE ADDR+OFFSET,BYTE
1120   OFFSET=OFFSET+1
1130   SUM=SUM+BYTE
1140  END FOR F
1150  IF CHECK<>SUM THEN
1160   PRINT "!!ERROR!! AT LINE"!L
1170   STOP
1180  END IF
1190 END FOR L
1200 SBYTES MDV1_ATTACK,ADDR,OFFSET
```

Dumpx
P H Tanner

These two screen dump programs were inspired by the letter from Robin Pitcher in the May Issue of *Sinclair QL World*.

Dumpx is a general purpose program permitting a number of different styles such as single, double and quadruple density in bit image mode. Dumpy is less flexible, but faster.

Both programs are written in SuperBasic and are, therefore, a little slow, but they have the advantage that you can tailor them to your own needs. They should work with any Epson compatible printer.

```
32000 REMark : start of dumpx routine
32010 BEEP 15000,1,5,1,2,-2,0,0:kc=CODE(INKEY$(150
)):SELect ON kc
32020 =0:GO TO 32010
32030 =49,50,52,53,54
32040 opench:FOR i=131072 TO 162816 STEP 1024
32050 PRINT #255,"    ";CHR$(27);"*";CHR$(kc);CHR$(
0);CHR$(2);:FOR ii=0 TO 126 STEP 2
32060 a0=0:a1=0:a2=0:a3=0:a4=0:a5=0:a6=0:a7=0:REST
ORE 32480:FOR iii=0 TO 7
32070 c=i+ii+iii*128:wa%=PEEK_W(c):READ c
32080 IF wa%&&-32640:a0=a0+c
32090 IF wa%&&16448:a1=a1+c
32100 IF wa%&&8224:a2=a2+c
```

```
32110 IF wa%&&4112:a3=a3+c
32120 IF wa%&&2056:a4=a4+c
32130 IF wa%&&1028:a5=a5+c
32140 IF wa%&&514:a6=a6+c
32150 IF wa%&&257:a7=a7+c
32160 END FOR iii
32170 PRINT #255,CHR$(a0);CHR$(a1);CHR$(a2);CHR$(a
3);CHR$(a4);CHR$(a5);CHR$(a6);CHR$(a7);
32180 END FOR ii:PRINT #255:END FOR i
32190 =51,55
32200 opench:FOR i=131072 TO 162816 STEP 1024
32210 PRINT #255,"    ";CHR$(27);"*";CHR$(kc);CHR$(
0);CHR$(4);:FOR ii=0 TO 126 STEP 2
32220 a0=0:a1=0:a2=0:a3=0:a4=0:a5=0:a6=0:a7=0:b0=0
:b1=0:b2=0:b3=0:b4=0:b5=0:b6=0:b7=0:RESTORE 32460:
FOR iii=0 TO 7
32230 c=i+ii+iii*128:wa%=PEEK_W(c):READ c
32240 IF wa%&&-32768:a0=a0+c
32250 IF wa%&&16384:a1=a1+c
32260 IF wa%&&8192:a2=a2+c
32270 IF wa%&&4096:a3=a3+c
32280 IF wa%&&2048:a4=a4+c
32290 IF wa%&&1024:a5=a5+c
32300 IF wa%&&512:a6=a6+c
32310 IF wa%&&256:a7=a7+c
32320 IF wa%&&128:b0=b0+c
32330 IF wa%&&64:b1=b1+c
32340 IF wa%&&32:b2=b2+c
32350 IF wa%&&16:b3=b3+c
32360 IF wa%&&8:b4=b4+c
32370 IF wa%&&4:b5=b5+c
32380 IF wa%&&2:b6=b6+c
32390 IF wa%&&1:b7=b7+c
32400 END FOR iii
32410 PRINT #255,CHR$(a0);CHR$(b0);CHR$(a1);CHR$(b
1);CHR$(a2);CHR$(b2);CHR$(a3);CHR$(b3);CHR$(a4);CH
R$(b4);CHR$(a5);CHR$(b5);CHR$(a6);CHR$(b6);CHR$(a7
);CHR$(b7);
32420 END FOR ii:PRINT #255:END FOR i
32430 =REMAINDER :GO TO 32500
32440 END SELect
32450 CLOSE #255
32460 DATA 128,64,32,16,8,4,2,1
32470 DEFine PROCedure opench
32480 kc=CHR$(kc):OPEN #255,ser1:PRINT #255,CHR$(2
7);"A";CHR$(8);CHR$(27);"U1"
32490 END DEFine
32500 REMark : end of dumpx routine
```

Dump y
P H Tanner

```
32000 REMark : start of dumpy screendump routine
32010 BEEP 15000,1,5,1,2,-2,0,0:kc=CODE(INKEY$(150
)):SELect ON kc
32020 =0:GO TO 32010
32030 =68:d=1:e=2
32040 =83:d=0:e=1
32050 =100:d=1:e=0
32060 =115:d=0:e=0
32070 =REMAINDER :GO TO 32210
32080 END SELect
32085 t=DATE:CSIZE 2,0:AT 16,10:PRINT "option____"
;CHR$(kc)
32090 OPEN #255,ser1:PRINT #255,CHR$(27);"A";CHR$(
8);CHR$(27);"U1"
32100 FOR i=0 TO 126 STEP 2
32110 PRINT #255,"    ";CHR$(27);"*";CHR$(5+d+d);CH
R$(0);CHR$(1+d+e);
32120 FOR ii=163712 TO 131072 STEP -128
32130 c=i+ii:wa%=PEEK(c):wb%=PEEK(c+1):SELect ON d
=0:wa%=wa%:|wb%
32140 PRINT #255,CHR$(wa%);:SELect ON kc
32150 =100:PRINT #255,CHR$(wb%);
32160 =83:PRINT #255,CHR$(wa%);
32170 =68:PRINT #255,CHR$(wb%);CHR$(wa%);CHR$(wb%)
;
32180 END SELect
32190 END FOR ii:PRINT #255:END FOR i
32200 CLOSE #255
32210 REMark : end of dumpy screendump routine
```

BALLOONS
Andrew Price

Balloons is a highly original game that plays on the idea of a seesaw. Two hyper active little men attempt to burst three layers of balloons by being catapulted from the seesaw. As one lands on the seesaw the other is sent up to try and burst a balloon and safely land back on the seesaw.

Amusing sound effects and good graphics make this relatively short superbasic program a must for any QL games player.

```
1 REMark  ******************************
2 REMark  *                            *
3 REMark  *            1986            *
4 REMark  *                            *
5 REMark  *          BALLOONS          *
6 REMark  *                            *
7 REMark  * WRITTEN FOR THE SINCLAIR QL *
8 REMark  *                            *
9 REMark  *              BY            *
10 REMark *                            *
11 REMark *   A N D R E W   P R I C E   *
12 REMark ******************************
20 MODE 4
30 INK #0,7:INK #1,7:INK #2,7
40 WINDOW #1,440,130,37,83
60 BORDER #2,1,7
65 PAPER #2,2:CLS #2
70 PAPER 0:INK 7:BORDER 1,7:CLS
80 ii=0
97 A$="   BALLOONS "
98 OPEN_NEW #3,scr_92x12a21x40:BORDER #3,1,4:INK #
3,7:PAPER #3,2:CLS #3
99 INK #3,0:PRINT #3;A$:PAN #3,2:SCROLL #3,2:INK #
3,7:OVER #3,1:AT #3,0,0:PRINT #3;A$:OVER #3,0
101 once=1
102 graphics
105 GO TO 200
110 CLS:CLS #0
124 RESTORE 10000
126 FOR N=1 TO 11
128 READ A$:PRINT A$:SCROLL 2
130 NEXT N
132 PAN 3
135 PRINT:PRINT "                                  1986  A
NDREW PRICE"
142 SAW2$=" ";SAW1$="  ";BALLOON1="o":POP$
="[]"
145 X=30:SAW=1
150 PAUSE 1000
152 SC=0
160 GO TO 300
201 A=10:S=0
220 FIRST=1
230 AT #2,1,1
232 PRINT #2;"Using the cursor keys to move left
( ) and right ( ), you must try to     catch each m
an in turn as they fall from the air having attemp
ted to      burst a balloon."
234 PRINT #2;" The higher up the balloon, the more
 points scored for bursting it."
250 GO TO 110
300 IF once THEN RI #2,5,0:CLS #2,1
301 CLS
310 AT #2,1,50:PRINT #2;" 1986  Andrew Price."
320 DIM AA$(3,72):AA$(1)=FILL$("3",72):AA$(2)=FILL
$("2",72):AA$(3)=FILL$("1",72):SAW=0
331 LIVES=3
340 AT #2,7,1:PRINT #2;"LIVES LEFT : ";LIVES:CLS #
0
400 IF LIVES=3 THEN CLS
405 AT 5,0:CLS 2
410 SCORE
452 AT 10,X:INK 4:PRINT SAW1$:INK 7
455 FOR F=1 TO X-1:AT 10,F:PRINT "  ":PAUSE 2:IF F
/2=INT(F/2) THEN BEEP 1,100:GO TO 459
```

```
457 BEEP 1,50
459 NEXT F
460 IF LIVES<>3 THEN GO TO 467
461 AT 0,0:
462 INK 4,7:PRINT FILL$(BALLOON$,72)
464 INK 2:PRINT FILL$(BALLOON$,72)
465 INK 7,0:PRINT FILL$(BALLOON$,72):INK 7
466 AT 10,X:INK 4:PRINT SAW1$:INK 7:AT 9,X:PRINT "
 \  ":AT 10,X:PRINT " ";:OVER 1:PRINT "#":OVER 0:S
AW=1
467 IF X+6>69 THEN GO TO 486
468 OVER 0:FOR F=70 TO X+6 STEP -1:AT 10,F:PRINT "
^ ":PAUSE 2:IF F/2=INT(F/2) THEN BEEP 1,100:GO TO
470
469 BEEP 1,50
470 NEXT F
471 T=X+6
472 FOR F=10 TO 6 STEP -1
473 AT F+1,T:PRINT "  ":AT F,T:PRINT "^ "
474 PAUSE 5:IF F=8 THEN T=T-1
475 NEXT F
480 FOR F=6 TO 9
482 AT F-1,T:PRINT "  ":AT F,T:PRINT "^ "
484 PAUSE 5:IF F=8 OR F=7 THEN T=T-1
485 NEXT F
486 SAW=2
490 Q=9:W=X+1
492 B=-1
500 REMark ** S T A R T **
520 IF SAW=1 THEN AT 10,X:INK 4:PRINT  SAW1$:INK 7
:AT 9,X:PRINT " \  ":AT 10,X:PRINT " ";:OVER 1:PRI
NT "#":OVER 0
525 IF SAW=2 THEN AT 10,X:INK 4:PRINT SAW2$:INK 7:
AT 9,X:PRINT "   \ ":AT 10,X:OVER 1:PRINT "   #";:
OVER 0:PRINT " "
530 AT A,S:PRINT " ":AT Q,W:PRINT "^":A=Q:S=W
535 IF SAW=2 AND RND(3)>=2 AND Q>3 AND Q<9 THEN W=
W+1
536 IF SAW=1 AND RND(3)>=2 AND Q>4 AND Q<9 THEN W=
W-1
540 Q=Q+B:IF Q>2 THEN GO TO 600
545 SAS=AA$(Q+1,W)
550 IF Q=2 AND SAS THEN SC=SC+1:SCORE:B=1:POP:AA$(
3,W)="O":IF W/2<>INT(W/2) THEN AA$(3,W-1)="O"
552 IF Q=2 AND SAS AND W/2=INT(W/2) THEN AA$(3,W+1
)="O"
555 IF Q=1 AND SAS THEN SC=SC+2:SCORE:B=1:POP:AA$(
2,W)="O":IF W/2<>INT(W/2) THEN AA$(2,W-1)="O"
557 IF Q=1 AND SAS AND W/2=INT(W/2) THEN AA$(2,W+1
)="O"
560 IF Q=0 AND SAS THEN SC=SC+3:SCORE:B=1:POP:AA$(
1,W)="O":IF W/2<>INT(W/2) THEN AA$(1,W-1)="O"
562 IF Q=0 AND SAS AND W/2=INT(W/2) THEN AA$(1,W+1
)="O"
565 IF Q=0 THEN B=1
610 IF Q=11 AND W<>X+1 AND W<>X+2 AND SAW=2 OR Q=1
1 AND W<>X+3 AND W<>X+2 AND SAW=1 THEN GO TO 8000
620 X=X+(KEYROW(1)=16 AND X<68)-(KEYROW(1)=2 AND X
>0)
630 IF Q=11 AND SAW=1 THEN SAW=2:B=-1:Q=9:W=W-2:GO
 TO 500
632 IF Q=11 AND SAW=2 THEN SAW=1:B=-1:Q=9:W=W+2
650 IF SC=30 AND FIRST THEN CLS #0:PRINT #0:PRINT
#0;" EXTRA MAN !":BEEP -20000,100,200,15,5,15,1:LI
VES=LIVES+1
651 IF BEEPING THEN GO TO 651
652 IF SC=30 AND FIRST THEN AT #2,3,1:PRINT #2;"LI
VES LEFT : ";LIVES:CLS #0:FIRST=0
699 GO TO 500
999 STOP
6000 DEFine PROCedure SCORE
6010 AT #2,1,1:PRINT #2;"SCORE : ";SC;"  "
6020 END DEFine
6030 DEFine PROCedure HIGHSCORE
6040 AT #2,5,1:PRINT #2;"HIGH SCORE : ";HI;"  "
6050 END DEFine
6060 DEFine PROCedure POP
6065 IF W/2=INT(W/2) THEN AT Q,W:PRINT "[]":PAUSE
5:BEEP 100,10:AT Q,W:PRINT "  ":END DEFine
6070 AT Q,W-1:PRINT "[]":PAUSE 5:BEEP 100,10:AT Q,
W-1:PRINT "  "
6080 END DEFine
8000 REMark DEAD
8001 once=0
8005 Q=Q-1
8010 AT Q,W:PRINT " "
8012 AT Q,W:PRINT "~"
8013 BEEP 20000,4,2,4,3,2,3,2
8015 AT Q,W:PRINT "*"
8017 PAUSE 20:BEEP 20000,10,7,5,3,8,6,5
8020 AT Q,W:PRINT "%":PAUSE 20
8030 LIVES=LIVES-1
8035 AT #2,3,1:PRINT #2;"LIVES LEFT : ";LIVES
8037 FOR F=1 TO 1000:NEXT F
8040 IF LIVES<>0 THEN GO TO 400
8045 IF SC>HI THEN HI=SC:HIGHSCORE
8050 CLS #0:PRINT #0:PRINT #0;"
     PRESS 'SPACE' TO CONTINUE"
8055 IF KEYROW(1)=64 THEN GO TO 8055
8056 IF KEYROW(1)<>64 THEN GO TO 8056
8057 IF KEYROW(1)=64 THEN GO TO 8057
8060 GO TO 110
9000 DEFine PROCedure graphics
9050 set=167722
9060 old=PEEK_L (set)
9070 news=RESPR(975)
9080 FOR N=0 TO 875 STEP 4
9090 POKE_L news+N,PEEK_L (old+N)
9100 END FOR N
9110 POKE_L set,news
9120 RESTORE 9200
9130 FOR char=1 TO 16
9140 READ c$:c=CODE (c$)
9150 charpoke=news+10+(c-32)*9
9160 FOR dat=1 TO 9
9170 READ d:POKE charpoke+dat,d
9180 END FOR dat
9190 END FOR char
9200 DATA "_",0,0,0,0,0,28,96,128,4
9210 DATA "~",0,0,4,24,224,48,120,252,252
9220 DATA "+",4,56,192,0,0,0,0,0,128
9230 DATA "^",128,112,12,0,0,0,0,0,4
9240 DATA "`",0,0,128,96,28,48,120,252,252
9250 DATA "{",0,0,0,0,0,224,24,4,128
9260 DATA "<",4,12,28,28,12,4,0,12,16
9270 DATA "}",240,248,204,204,248,240,64,128,0
9280 DATA "[",16,72,32,128,32,64,16,36,8
9290 DATA "]",144,36,8,4,8,4,16,72,32
9300 DATA "~",56,84,56,16,56,84,16,40,68
9310 DATA "%",48,48,252,252,48,48,48,48,48
9320 DATA "*",0,64,4,32,0,40,76,180,232
9330 DATA "\",0,0,0,0,0,0,0,56,84,56
9340 DATA "#",16,56,84,24,36,64,0,0,0
9342 DATA "@",16,56,84,48,72,4,0,0,0
9350 END DEFine
10000 DATA "{}{}{}      {}    {}        {}
{}{}    {}{}    {}    {}    {}{}{}"
10002 DATA "{}{}{}{}      {}{}    {}        {}        {}
{}{}{}  {}{}{}{}{}  {}    {}  {}{}{}{}{}"
10004 DATA "{}    {}    {}    {}    {}        {}        {}
    {}  {}    {}  {}{}{}  {}  {}"
10006 DATA "{}    {}    {}    {}    {}        {}        {}
    {}  {}    {}  {}{}{}  {}  {}"
10008 DATA "{}    {}    {}    {}    {}        {}        {}
    {}  {}    {}  {}  {}  {}  {}"
10010 DATA "{}{}{}    {}{}{}{}  {}        {}        {}
    {}  {}    {}  {}  {}  {}{}{}"
10012 DATA "{}{}{}    {}{}{}{}  {}        {}        {}
    {}  {}    {}  {}  {}{}      {}"
10014 DATA "{}    {}  {}    {}  {}        {}        {}
    {}  {}    {}  {}  {}{}      {}"
10016 DATA "{}    {}  {}    {}  {}        {}        {}
    {}  {}    {}  {}    {}      {}"
10018 DATA "{}{}{}{}  {}    {}  {}{}{}{}  {}{}{}{}  {}
{}{}{}  {}{}{}{}  {}    {}  {}{}{}{}"
10020 DATA "{}{}{}    {}    {}  {}{}{}{}  {}{}{}{}
{}{}      {}{}    {}    {}  {}{}{}{}"
```

PROGS

READY TO RUN SOFTWARE

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Microdrive Exchange gives you the opportunity to obtain software featured in The Progs and elsewhere in the magazine without the hassle of typing it all in.

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If you want us to supply the drive, please add an extra £2.50 for every cartridge required and mark the order form appropriately.

Program of the month

Program of the Month for October is *Attack of the Things*, an inspiringly-titled arcade game from Stuart Campbell of Greenock.

The program is written entirely in machine code and the result is a game which, in terms of speed and graphics, is on a par with professionally-produced games.

You must wrestle with the controls of your multi-coloured spacecraft to dodge waves of Things as they attack from the right of the screen. The Things take various forms from spherical blobs to sticks of rock and contact with one spells instant death for one of your three craft.

Things can be repelled by means of the Campbell stun gun which bounces them back to the screen, edge but does not destroy them. The attack is relentless and only the best will attain the high score position.

Update

Touch Type by S J Ackers is now Supercharged. That means the program loads in about 15 seconds. More important, no restriction is placed on typing speed, so you can go as fast as you like and your key depressions will be indicated on the screen instantaneously. In addition, the screen layout is suitable for television sets as well as monitors.

Acknowledgement to Digital Precision for use of the Supercharge compiler. Supercharge is available from Digital Precision, 222 The Avenue, London E4 9SE. Price £59.95.

ORDER FORM

Author	Language	Program Name	Price	Issue	Size
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Converts Assembler source into m/c object code					
Richard Cross	(AO)	**Mini Monitor**	£3	Oct	60☐
Pocket-sized monitor with comprehensive facilities					
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Pit your wits against the QL					
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From fairway to green on 50 different courses of varying difficulty					
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The basis of our games programming series — a Space Invaders type game written entirely in machine code					
Richard Cross	(MB)	**Sprite Animation**	£2	Apr	50☐
A subtle blend of machine code and SuperBasic which produces a versatile sprite designer and high-speed animator					
Steve Deary	(B)	**Pacman**	£1	Mar	20☐
A reasonably fast rendition of the famous arcade favourite					
Andy Carmichael	(B)	**Family Tree**	£3	Aug	100☐
Archive program and database for setting-up and displaying large family trees					
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Composer and play sheet music on the QL					
Mathew Capp	(B)	**Miners**	£2	Aug	30☐
A nail-biting management simulation which puts you in charge of the NCB					
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R Green	(B)	**Othello**	£1	Aug	25☐
A 3D version of the well-known board game Othello for one or two players					
S J Ackers	(S)	***Touch Type**	£4	Aug	80☐
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Rob Sherratt	(AO)	**FCOPY**	£4	Mar'86	80☐
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A high-resolution multi-coloured map of the world for geography buffs					
J M Dower	(B)	**Mushyman**	£2	Jun/Jul'86	15☐
Mushroom munching arcade action					
Tony Quinn	(S)	***CAD QL**	£5	Sept'86	120☐
Professional features include rubber banding and user-definable symbol library					
Stuart Campbell	(MB)	**Attack of the Things**	£3	Oct'86	45☐
Can you repulse the attacking Things?					

B = SuperBasic, AO = Assembler + Object Code (ready to run), MB = Machine Code + Basic Loader, S = Supercharged

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* **TURBO** compiles programs **faster** than any other SuperBASIC compiler: it typically works more than **TWICE AS FAST** as the pseudo-compiler QLiberator.
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* **TURBO** supports **instant linking** - a powerful and unique multitasking feature. Programs can be compiled in parts and 'linked' in milliseconds as they load! Composite taks of unlimited size can be built on a 128K QL: if you make changes you only re-compile modules that have been altered!!
* Compiled tasks can efficiently call, read and write to any number of procs, fns, arrays, variables and channels **separately compiled** into other tasks running concurrently!
* **TURBO** is supplied with a **library** of 64 amazing new BASIC commands, functions and directives - the **TURBO** TOOLKIT.
* Arrays of any number of dimensions may be passed as **parameters** of procedures or functions, at lightning speed, even between two tasks!! This is unbelievable!
* **TURBO** adds reliable **WHEN ERROR** trapping to ALL versions of the QL, including AH and JM.
* In general, large programs are **smaller** and use significantly less data space when compiled with **TURBO**, compared with their pseudo-compiled or interpreted counterparts.
* No cumbersome protection system - once invoked, **TURBO** remains **resident**.
* Parameters may passed to compiled tasks as they are invoked, and **pipes** allow tasks to communicate via PRINT and INPUT.
* **TURBO** has all the powerful, popular features of **SUPERCHARGE** - comprehensive and flexible reporting, user-controlled space/speed optimisation, multi-tasking, stand-alone code, support of the entire syntax of SuperBASIC, support for 'alien' procedures and functions (with optimisation of TURBO TOOLKIT commands), fast code loading, two extra digits of arithmetic precision compared with the interpreter and pseudo-compiler, etc.
* **TURBO** has a powerful and original **user-interface**. You can start the compiler with a single command. You can compile several programs while only loading the compiler once, editing the programs between compilations. Compilation is a one-step process: you can trigger a complete default compilation by pressing one key from the main menu, yet a host of useful compiler options are available: you can adjust the defaults yourself.
* **TURBO** has a detailed, readable A4 manual, containing tutorial and reference sections, hints and tips, plus over **100 example programs**.

TURBO costs £84.95 on disk or two microdrive cartridges.

Supercharge owners may claim a discount of £35 when they upgrade to TURBO - send us £49.95, plus page 100 of your Supercharge manual as proof of purchase

TURBO TOOLKIT

A package of 64 new SuperBASIC commands, functions and directives, for anyone seeking to realise the QL's true potential
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* Example program shows you how to use **TURBO** TOOLKIT commands for: graphic effects, user defined keys, random-access files, 'pipes' (temporary RAM files), transient (pop-up) windows, continuous background music, fast filing systems, SuperBASIC development tools, and much more.

TURBO TOOLKIT COMMANDS
* Task invokation and communication: EXECUTE EXECUTE_W EXECUTE_A CHARGE DEFAULT DEVICE LINK_LOAD CONNECT CHANNEL_ID SET_CHANNEL
* On-screen data editing functions: EDIT$ EDIT% EDITF
* Super fast memory handling commands: MOVE_MEMORY PEEK$ POKE$ SEARCH_MEMORY ALLOCATION DEALLOCATE
* File and data handling: DEVICE_STATUS (improved) DEVICE_SPACE POSITION SET_POSITION INTEGER$ FLOAT$ STRING$ GET% GET$ GETF INPUT$
* SuperBASIC utility commands: BASIC_INDEX% BASIC_W% BASIC_B% BASIC_L BASIC_POINTER BASIC_NAME$ BASIC_TYPE%
* Task control commands: LIST_TASKS SET_PRIORITY REMOVE_TASK SUSPEND_TASK RELEASE_TASK SLEEP
* **TURBO** compiler directives: IMPLICIT% IMPLICIT$ GLOBAL EXTERNAL GLOBAL PROCEDURE GLOBAL FUNCTION DATASPACE REFERENCE WHEN_ERROR END_WHEN for AH and JM QLs COMPILED OPTION_CMD$
* And much more ... TYPE_IN & COMMAND_LINE let a task enter ANY command or sequence of characters into any window. SET_FONT for user defined graphics. FREE_MEMORY finds the amount. END_CMD allows command files. CURSOR_OFF & CURSOR_ON select windows with automatic cursor ...

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The corresponding speedups on Metacomco's ED are: 1x,3,4x,11x,10x,14x,26x,53x,59x,26x.

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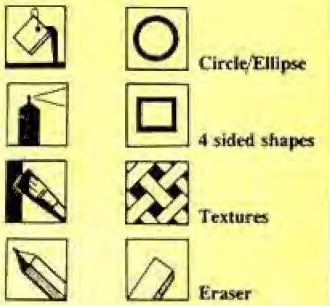

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